

FBIOTES

GENERAL SCIENCE (EM)

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**9TH
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1

Introduction and Role of Science

Section-I

Introduction to Chapter

Contents: This chapter revolves around following topics.

- Science and Its Origin.
- Science as A Part of Islam.
- Periods of Scientific Process.
- Famous Scientists of Past.
- Science and Muslim Scientists.
- Pakistani Scientists.
- Integration of Different Fields of Science.
- Divisions of Science.
- Basic Concepts of Physical Sciences (Astronomy, Chemistry, Geology, Physics), Biological Sciences (Zoology, Botany), Agriculture, Medicine and Engineering.
- Science as Cause of Materialized Society.
- Limitations of Science.

Concepts:

> Why to study general science?

Study of science is the need of time. This is the age of science and technology and only those nations of the world are progressing and dominating which are doing new advancements in the fields of communication, computer, electronic, agriculture and nuclear energy research. Science today has progressed so much that a plant breeding is now able to produce wheat plants ranging from the length of a few centimetres to man's height. A nuclear engineer is able to formulate booms of mass destruction for the security of his nation and missiles to carry them to other parts of the world in case of foreign aggression. An Internet user is able to see and talk to his dear ones for hours sitting miles away from him in very short expenses.

In this fast growing world those nations who would not progress in defence will be destroyed by stronger ones. Nations behind in agricultural research will die of hunger. Those not doing work on natural resource conservation will barren their agricultural lands. Less developed nations in electronic, conservations of edible commodities, fibre industry, electronics and in good quality of their domestic products will not be able to compete for the international market standards and no one will be ready to purchase their products if at all they produce. So in the way of teaching science to our nation it is necessary to give the general concepts of science to our young generations.

> What is the need to study the history of science?

Thorough study of the history is passage through which science has progressed to this age. One scholar carries research in a particular field by consuming all of his life, now a young researcher first furnishes himself with the knowledge of previous efforts by the study of history. Keeping in view the previous findings he manages his work for the further achievements and discoveries in the same field. For example first computer made by man was several feet in length and width but continuous research has brought up a laptop computer which is only a few centimetres in its dimensions.

ختم نبوت ﷺ زندہ باد

عظمت صحابہ زندہ باد

السلام علیکم ورحمۃ اللہ وبرکاتہ:

معزز ممبران: آپ کا وٹس ایپ گروپ ایڈمن "اردو بکس" آپ سے مخاطب ہے۔

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صدیق، حضرت عمر فاروق، حضرت عثمان غنی، حضرت علی المرتضیٰ، حضرت حسنین کریمین رضوان اللہ تعالیٰ اجمعین، گستاخ اہلبیت یا

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اللہ تبارک تعالیٰ ہم سب کا حامی و ناصر ہو

Study of history is also aimed to honour the great scientists of past.

Section-II

Comprehensive Questions with Answers

1. Discuss the brief history and importance of science.

Ans. Definition: "It is branch of knowledge which is based on facts, experimentation and observations performed in a systematic way to solve the problems of man and quest of exploring the universe."

Origin: The history of science is as old as the history of human being. The word science has originated from a Latin word meaning "to be aware of" or "to know". The ancient man had been applying science in many fields. He had been involved in the breeding of best varieties of crops and livestock by the selection of best individuals and then reproducing them for the next generations.

Importance: Science is a way to guide the man through its quest in discovering secrets of the universe, understanding the processes and phenomena of nature and acquiring maximum comfort, protection and security in their lives. The discoveries and inventions made in different fields of science have changed the whole life style of man. It has helped him to become cultural and adopt himself in accordance with nature. Twentieth century has been proved to be the century of science causing radical changes in the style of lives.

Recent Advancements: Much advancement is still being done in many disciplines of science. Complicated diseases are being cured, more productive varieties of crops are being developed, and modern and fast communication devices are being invented.

Drawbacks: As science has made human's life more complex, it has caused many problems too. With the invention of modern weapons of defence and development in nuclear oriented booms, man's survival on earth has become more

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insecure. New inventions of transportation, entertainment and comfort has not only caused much of human population to become psychological patients but also reduced the value of human's emotions and feelings. As a whole all of these developments in science have made man more materialistic.

2. What is the concept of science in Islam? Justify your answer with examples from the verses of "QURAN".

Ans: Islam is a religion gifted by Allah with all the aspects of human welfare for all times and events. It has guided man to become simple, realistic, and natural in our acts and fully explore and exploit the nature. In this age we have been provided with three sources of our religious knowledge; Quran, sayings of Prophet (PBUH) and literature from our religious scholars. Most of our references will be from first two sources.

Science of QURAN: In the Holy Book "QURAN" Allah has emphasized man to equip himself with the knowledge of universe he lives in along with the know how of his religion. He has stimulated man to know the phenomena of earth, beneath earth, oceans, mountains, skies, winds, forests, diversity of life, nature of stars and other hidden realities of universe.

Saying of Prophet (PBUH): The Holy Prophet (PBUH) has said, "to acquire knowledge is the duty of every Muslim man and woman". So this indicates that Islam does not distinguish male or female in gaining knowledge of science of technology.

Verses of QURAN: There are many verses of Quran related to science. Few of them are given with explanation.

"They ponder over the creation of earth and heavens" 3:191.

In this verse Allah has described a quality of believers that they think over the creation of universe, including the earth, stimulating Muslims towards science.

"Indeed, the creation of earth and heavens (skies), the difference of day and night are the indications for the wise and intelligent" 3:190.

Allah emphasizes man to do research to the nature of earth, skies and alternation of days and nights. This shows the

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strength of Allah to those who are wise and intelligent or in other words scientists.

"Allah is the Creator Who has made every thing between the Earth and the heavens. He has made every thing subsequent to man and there is a great incentive for man to exploit these hidden treasures for the mankind" 2:163.

In this verse Allah has told man that He is the only creator of all the things of universe and has made these for the benefits of man. Allah says that he has made everything favourable for man to do research and exploit the treasures which are hidden at different spots of earth's surface.

"And He is the Allah, Who created every living thing from water. Out of them, some crawl, some are tetra pods, and some bipedal. He is the Almighty and The Creator" 24:45.

Water is said to be the source of the origin of life on earth as discovered by the modern scientists. This verse also gives the importance to study the diversity of life on earth. The different modifications in living organisms like developments of four or two legs, or the crawling habit of animals indicate the evolutionary requirements of life for its survival on earth.

3. Give different periods of scientific process and also discuss major scientific achievements by different scientists of each period.

Ans: We divide the long scientific process into four periods for our convenience.

a. Greek Period:

It is the start of science ranging 300-600 BC. In this period the basic scientific phenomena were discovered. This period saw many great scientists including Galen, Archimedes, Pythagoras, and Aristotle.

b. Muslim Period:

It is spread over a long period of 700-1300 AD. It was

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time when all the Europe was not aware of the basic ideas of science and knowledge. The Muslim scientists made great achievements in the fields of chemistry, astronomy, mathematics, physics and statistics on the basis of which the European scientists laid the foundations of their work. Main scientists were Jabar bin Hayyan, Ibn-ul-Haitham, Bu Ali Sina and Al-Beruni.

c. Modern Period:

Most of the scientific work of this period was carried out during seventeenth and nineteenth centuries. This is the period of awakening of the western people. They started taking interest in that scientific work, Muslims were busy in. They translated scientific books of Muslims in their local languages like French, English, and German. In this period many basic facts and laws of physics, chemistry and medical science were discovered including the concepts of gravitational force. Main scholars of this period were Galileo, Isaac Newton, Micheal Darwan, Maxwell Edition and Marconi. One of the salient features of this period was the rejection of false ideas of past.

d. Recent Period:

This is spread to twentieth century onwards. In this period science has progressed very fast. It is the age of huge revolutions in the fields of nuclear energy, missiles, computers, laser technology, genetic engineering, space, electronics, telecommunication and medical sciences. Main scientists of this era are Albert Einstein, Max Planks, Fredrick and Bohr.

4. What is the contribution of Muslim scientists of Christian era (A.D.) to science?

Ans: This period of scientific research was dominated by the Muslim scientists. Many scientists did remarkable jobs in different aspects of science. Some of the most common are being discussed.

a. Jabar Bin Hayyan:

He was born in 722 and died in 803. He was a great chemist. For his contribution in this field, he has been given the title "Father of chemistry".

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Achievements: He artificially prepared different chemical compounds like sulphuric acid, nitric acid, hydrochloric acid along with techniques of distillation, sublimation and crystallization. These techniques are still being used in the analytic and applied chemistry.

b. Muhammad Ibne Zakariya Al-Razi:

His period ranges 861-930. Physics was his field of study and research. He has also contributed in the field of medical in the curing of some diseases.

Books: His famous books are "Al-Havi" and "Al-Mansoori". These were later translated in different languages like English, Latin and French.

Achievements: He discussed the symptoms and treatment of small pox, measles and anaesthesia

c. Ibn-ul-Haitham:

His period was from 965 to 1039. He was a physicist and his work revolves around optics. He is called Al-Hazem in Europe.

Book: He wrote a famous book "Al-Mana-Zir" in which he discussed optical phenomena.

Achievements: He discovered the basic principles of reflection, refraction, functioning of lenses and working of eyes.

d. Al-Bairuni:

He lived from 973 to 1048. He travelled through long distances and visited India to record his observations.

Books: He wrote more than 150 books including "Kitab-ul-Hind" and "Qanoon-i-Masoodi".

Achievements: His specialties include Astronomy, geology, physics, and mathematics. He discussed solar and lunar motions.

e. Bu Ali Sina:

His period ranges between 980-1037. He is called Avicenna in Europe. One of his medical books has been

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taught as a text book in Europe till seventeenth century.

Books: He wrote more than 100 books. His famous books are "Al-Qanun Filtib" and "Al-Shifa".

Achievements: He made great contributions to medical science, philosophy, literature, chemistry, arithmetic, music and biology.

f. Ibne Baitar:

His work is associated to Botany and Pharmacy. He worked on the diversity of plants and also studied different medicinal plants. He travelled through long distances and collected different plant species. He also discovered many new plants species.

g. Ibe-e-Afees:

He worked in medical science. He discovered the functioning of circulatory and respiratory systems. He was the first who discovered the blood as the circulatory fluid in the body in the thirteenth century.

5. How Pakistani scientists contributed to science?

Ans: Pakistan is not behind in science and technology from other world. There are many scientists of international reputation. Some more recognized are given below.

Dr. Abdus Salaam:

He is one of the great scientists of Pakistan nation is proud on. He is the only scientist of who got the Noble Prize of Physics. He worked hard to improve science and research in the poor countries.

Major Contributions: His major contribution is that he proposed the Theory of Unification. This theory is related to the four basic physical forces governing the universe.

Dr. Munir Ahmad Khan:

He is the pioneer chairman of "Pakistan Atomic Energy Commission". He participated in many courses of International Institute of Nuclear Technology. He worked hard for the establishment of progress of AEC.

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Dr. Ashfaq Ahmad:

He is the great atomic scientist of Pakistan and worked for ten years in AEC. For his great work in atomic energy, he was awarded Nishan-i-Imtiaz by the Government of Pakistan.

Major Contributions: His major contribution is the establishment of Global Change Impact Studies Centre i.e. GCISC. His contribution to the advancement of AEC will be remembered for ever.

Dr. Abdul Qadeer Khan:

He is the hero of Pakistan. Whatever might happen on the international scene, he will remain in the hearts of every Pakistani citizen. He is the scientist of international reputation who worked for his motto of "Atom for Peace".

Major Achievements: Dr. Abdul Qadeer Khan introduced the technology of enrichment of Uranium in Pakistan and worked on further advancements in this field. He is person who established "Kahuta Research Laboratories" which was later named after his name as "Dr. A.Q. Khan Laboratories".

Dr. Samar Mubarak Mand:

He is the chairman of National Engineering and Scientific Commission. He was awarded Sitara-e-Imtiaz and Hilal-e-Imtiaz for his work in nuclear instrumentation, nuclear diagnostics, laser, fibre optics technology and missiles technology. He also worked as member of Pakistan Atomic Energy Commission.

Dr. Ata-ur-Rehman:

He is the chemist of international reputation and is awarded by national and international awards. He first joined Hussain Ibrahim Jamal Institute of Chemistry, Karachi. He published about 200 research papers related to his field. These papers are taught to the students of many universities of the world as a part of their syllabi. He has been awarded Sitara-e-Imtiaz.

6. How different fields of science are integrated to each other?

Ans: Science is aimed to solve problems of man. For this purpose we have to integrate different fields of science. For surgery in medical science also involve use of many

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equipments based on principles of physics. Similarly geology is associated to mechanical engineering for the exploitation of oil and gas resources. Therefore it is necessary for a scientist of any field that he should have at least some basic knowledge of all fields of science.

7. What are different branches of science? Briefly describe.

Ans: Science is broadly divided into two branches which are further divided into minor branches.

a. Physical Sciences:

This branch of science deals with non-living universe. It is further divided into following branches.

Astronomy:

Definition: "It the branch of physical sciences that deals with the heavenly objects like stars, planets and galaxies".

History: Many nations remained involved in the research in this field like Chinese, Egyptians, Babylonians and Muslims. They studied those heavenly bodies which can not be seen with naked eye. These were the earlier scientists who established concepts of days, weeks, months and years on the basis of their studies. Islamic system of Hijri is also based on the lunar motion.

Role of Telescope: It is the telescope due to which the advancement in the modern astronomy became possible. First telescope was invented in 1610 by Galileo. The studies based telescopes are more statistical and accurate. Recent studies in this field are being done on black hole, cluster of galaxies and probability of life on some other planet. This field is closely associated with physics and mathematics.

Chemistry:

Definition: "The branch of physical sciences that deals with the composition, properties, changes in matter and also the principles and laws governing these changes is called Chemistry".

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Explanation: Chemistry is associated to all the chemical compounds including some simple ones like water to complicated compounds that constitute living bodies like proteins, carbohydrates and fats. The branches of chemistry dealing with the chemical compounds present in the living bodies is titled as bio-chemistry.

Examples: Some of examples of chemical phenomena are acid base titrations, change of physical appearance of water with temperature, rusting of iron, release of oxygen and absorption of carbon dioxide by plants, burning of candle and occurrence of acid rains.

Geology:

Definition: "It is the branch of physical sciences dealing with physical aspects of earth".

Explanation: This branch is associated to the study of the natural resources of earth including soil, rocks, minerals, oil, and gas and water resources development. As this field is associated to the exploration and excavation of oil and gas which are most precious treasure today, so this field is getting more and more importance now-a-days. In Pakistan "Geological Survey of Pakistan" is working in this field and is busy in exploring the natural resources hidden beneath earth.

Branches: It is further divided into Geophysics and Geography for the sake of specialization in the study.

Physics:

Definition: "It is the field of science that deals with the properties of matter and energy and the interaction between these two".

Explanation: Physics is a very important component of science because it deals with the equipments which are used in all disciplines. These include telescopes, radio, television, tape recorders, radars, computers, digital watches, cameras, microscopes, digital rain gauges and laser related equipments.

Divisions: This field is further divided into mechanics, sound, light, heat, electricity, magnetism, nuclear and atomic studies.

b. Biological Sciences:

It is also a very vast field dealing with all the living things of world studying their evolution on earth, their diversity, structure, habitats and functioning. Its main divisions are two i.e. Botany and Zoology

Botany: "It deals with all aspects of plants starting from Cytological (cellular) studies to the fossil research (dead remains)".

Zoology: "It deals with all aspects of animals".

Miscellaneous: Agriculture and medicine are the fields which are closely associated to both of the branches of science i.e. physical and biological sciences especially chemistry, botany and zoology.

8. Discuss the role of agriculture, medicine and engineering in human's life.

OR

How science and technology is applied for the human welfare?

Ans: Technology is the application of any scientific principles, laws or findings for the welfare of human being. Agriculture, medicine, engineering (including the development in industries of vehicles, electronics, communication, computers, drugs, construction and military weapons) are all examples of technology.

Agriculture: "It is the science, art and industry of using and managing the living organisms (plants, animals, micro-organisms) for human use".

This field is more important even from medicine because human's first need is food and then curing of diseases associated to him. It deals with the crop production, livestock and natural living resources of world. In case of field crops major inputs include the certified seed, irrigation, fertilizers, pesticides and weedicides. The machinery involved includes tractors, scrapers, combine harvesters, threshers, tube wells and equipments of sprinkle and drip irrigation systems in developed regions. The basic aim of agriculture is to produce more food and quality food so that it would be consumable

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without any health hazards.

Medicine: It deals with the health of man. This field has progressed much over the years inventing many antibiotics and vaccines curing much complicated diseases of humans. Cancer, aids, hepatitis are the burning issues these days. Medicine is closely associated with bio-chemistry. After agriculture, this field gains more importance in man's life.

Engineering: Pyramids of Egypt are the examples of great engineering skills of human of old ages. Karakoram highway and Great Wall of China are the examples of today's development in this field. By the construction of huge machineries of mills and factories man has become able to produce thousands of utility goods. It has contributed a lot in the conservation of water resources by its application for the construction of dams, barrages and canals. It has made possible for man to construct huge buildings of hundreds of floors.

9. Give a brief summary of the limitations of science?

Ans: Some ground examples of science limitations are:

- There is no formula, method or procedure in science to calculate, evaluate and analyse moral and spiritual values. For this sake we still have to rely upon our customs and old traditions.
- Science is still unaware of many hidden facts of nature.
- Science is still unable to produce a single living organism with the help of non-living things.
- Only those parts of universe have been discovered up to which our telescopes range.
- Many diseases of humans, plants and animals are still un-cured.
- There is no way to stop the degradation of living cells and thus prevent death.

Solved Exercises of Text Book

1. Complete the following statements:

- Jabber-Bin-Hayyan is the father of Chemistry
- The theory of relativity was formulated by Albert Einstein
- Astronomy is the branch of physical sciences that deals with the study of earth
- Biological sciences are divided into two branches i.e. botany and Zoology
- The irrigation has been made more dependent and regular by the construction of canals and dams

Answers:

i)	ii)	iii)	iv)	v)
Chemistry	Albert Einstein	earth	zoology	dams

2. Tick (✓) the following statements either True or False:

i)	Ibn-Nafees was the first scientist who explained the structure of eyes.	False
ii)	Dr. Abdus Salaam was a great physician.	False
iii)	Pharmaceutical is a branch of medicine that deal with the preparation of drugs.	True
iv)	Science has appreciated the human qualities like love, justice and truth.	False

3. Encircle one choice a, b, c or d in each case:

- Greek period of scientific contribution ranges from:
~~(a)~~ 300BC–600BC (b) 300BC–800BC
(b) 500BC–500BC (d) 400BC–700BC

Ans. (a) 300-600 BC

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- ii) Muslim period of scientific contribution ranges from:
- (a) 600AD to 1000 AD (b) 800 AD to 1200 AD
☒ (c) 700AD to 1300 AD (d) 1000 AD to 1500 AD

Ans. (c) 700-1300 AD

- iii) Dr. Abdus Salam proposed a theory of unification for the:
- (a) 3 Basic forces ☒ (b) 4 Basic forces
(c) 2 Basic forces (d) 5 Basic forces

Ans. (b) 4 Basic forces

- iv) The main categories in which science is divided are:
- ☒ (a) 2 (b) 4
(c) 5 (d) 6

Ans. (a) 2

4. What is the role of science and technology for the betterment of human living?

Ans: Science and technology has contributed a great deal for the betterment of human being. Every aspect of human life has improved with many wonderful discoveries of science. It has improved the living standard of human through the advancements in the fields of agriculture, industry, transport, communication, computers, television, drugs, new power production techniques and management of natural resources. The whole of human society has been improved and people are living more comfortable life than they that they lived in the past.

The science and technology has also helped the mankind to construct such laws and regulations that govern the human society. These laws have not only checked the society disturbing agents causing hurdles in the human betterment but also suggested new strategies for the welfare of man.

The advancement in the field of agriculture has enabled human to develop some new methods to produce more

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food as well as quality food. By the application of balanced farm inputs including seeds, fertilizers, pesticides and irrigations at right lead to the better crop production.

Research in the field of medicine has enabled man to cure many diseases which were incurable in the past causing numerous human mortalities. Similarly engineering has lead the man to store huge amounts of water in dams, construct mills and factories with mass production of utility goods. Still the communication modernization has turned the world into a global village.

5. Briefly describe the contributions of Al-Bairuni, Ibnul-Haitham and Jabir Bin Hayyan in the field of Science.

Ans: Al-Bairuni: He lived from 973 to 1048. He travelled through long distances and visited India to record his observations.

Books: He wrote more than 150 books including "Kitab-ul-Hind" and "Qanoon-i-Masoodi".

Achievements: His specialties include Astronomy, geology, physics, and mathematics. He discussed solar and lunar motions.

Ibn-ul-Haitham: His period is 965 to 1039. He was a physicist and his work revolves around optics. He is called Al-Hazem in Europe.

Book: He wrote a famous book "Al-Mana-Zir" in which he discussed optical phenomenon.

Achievements: He discovered the basic principles of reflection, refraction, functioning of lenses and working of eyes.

Jabar Bin Hayyan: He was born in 722 and died in 803. He was a great chemist. For his contribution in this field, he has been given the title "Father of chemistry".

Achievements: He artificially prepared different chemical compounds like sulphuric acid, nitric acid, hydrochloric acid along with techniques of distillation,

sublimation and crystallization. These techniques are still being used in the analytic and applied chemistry.

6. What is the role of science in the fields of agriculture and medicines?

Ans: Science has brought enormous changes in the fields of agriculture and medicine especially during twentieth century.

Role in Agriculture: Science has helped man in agriculture and medicine to great extend. In agriculture science has guided him to develop productive, good quality and disease resistant crop varieties, formulate pesticides to kill the pests of crops, produce fertilizers to provide good amount of nutrients to the plants and introduce modern irrigation systems like sprinkler and drip irrigation for the purpose of least wastage of water resources.

Role in Medicine: In medicine biochemistry has enabled man to develop many antibiotics and vaccines used to cure diseases. Electronics has produced many types of equipment used in the surgery. Research in the newly emerging diseases has guided to find out the nature and the causing agents and then efforts are done to minimize the cause.

Section-III

Questions with Short Answers

1. What is Science?

Ans: Science is a gaining of knowledge in a systematic way based of facts, observations and experiments. Unlike other branches of knowledge, science does not believe on the visual observations but believe on the ground proves. In science each law, principle or theory is formulated by carrying out a series of experimentations so that to minimize the errors.

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- 2. Every young Muslim should acquire knowledge of science. Comment.**

Ans: According to the saying of Prophet Muhammad (PBUH), it is the duty of every Muslim man and woman to get knowledge. In many verses of Quran, Allah has emphasized man to explore the universe to its full. In Quran there is discussion about the diversity, gender, origin and evolution of life on earth. All these are the indications that insist a Muslim to get involved in modern knowledge of science and technology.

- 3. How twentieth century has proved to be the century of science?**

Ans: In twentieth century huge scientific development took place. Man progressed in all aspects of life including residence, security, communication and medicine. He made new discoveries and inventions in computers, laser, electronics, nuclear energy, space studies, food production and genetic engineering.

- 4. Why scientists of past had been scholars of multiples fields of science instead of one?**

Ans: This is because there was less development in science and only limited opportunities for research were available to them in each field.

- 5. Name the fields of science in which Bu Ali Sina worked.**

Ans: Bu Ali Sina worked in many fields of science including medicine, philosophy, literature, physics, chemistry, arithmetics, biology and music.

- 6. Why Dr. Abdus Salaam is famous?**

Ans: Dr. Abdus Salaam proposed "Theory of Unification" which was related to four basic forces governing the universe. He was awarded Noble Prize for his work.

- 7. What is Geology?**

Ans: "It is the branch of physical sciences dealing with physical aspects of earth". This field is associated to the study of the natural resources of earth including soil, rocks, minerals, oil, and gas and water resources

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development. As this field is associated to the exploration and excavation of oil and gas which are most precious treasure today, so this field is getting more and more importance now-a-days.

8. How engineering is important in agriculture?

Ans: Engineering is involved in construction of many agricultural equipments like tractors, scrapers, harvesters, threshers and tube wells. It also associated to the construction of mills and factories producing agricultural inputs like fertilizers.

9. What do you mean by Astronomy?

Ans: Astronomy is the branch of physical sciences that deals with the heavenly objects like stars, planets and galaxies. These were the earlier scientists who established concepts of days, weeks, months and years on the basis of their studies. Islamic system of Hijri is also based on the lunar motion.

10. What are the limitations of science?

Ans: Science is still unable to cure many diseases of plants, animals and human itself. Many hidden secrets of nature are still to be discovered. There is no permanent solution of natural hazards like floods, thunderstorms and earthquakes.

11. Write important scientists of Modern Period of scientific process.

Ans: This is the period of awakening of Europe. They took the books of Muslims and translated them into there local languages and laid the foundations of their scientific discoveries. Important scientists of this period are Galileo, Isaac Newton Micheal Darwan, Maxwell Edition and Marconi.

12. Name the fields in which science progressed during twentieth century.

Ans: During twentieth century science progressed in the fields of electronics, telecommunication, computers, laser, missiles, surgery, genetic engineering, space research, natural resource conservation, nuclear technology,

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transplantation of human organs, development of antibiotics and vaccines.

- 13. Why Jabar Bin Hayyan is called "Father of chemistry".**

Ans: Jabar Bin Hayyan is called father of chemistry because of his huge contribution to this field. He developed research laboratories where he prepared different chemical compounds and also discovered some scientific techniques.

- 14. What is the specialties of M. Ibne Zakariya Al-Razi?**

Ans: He did great contributions to medical sciences. He discovered the history, symptoms and treatment of some important diseases of man. He is the first person who used opium for anaesthesia.

- 15. Why Ibne Baitar is famous?**

Ans: Ibne Baitar contributed a lot in the fields of botany and pharmacy. He visited different parts of world, collected different species of plants and identified them.

- 16. Discuss Dr. Abdul Qadeer Khan's contribution to AEC.**

Ans: Dr. Abdul Qadeer Khan brought the technology of Uranium enrichment to Pakistan and carried out research on further advancements. He established Kahuta Research Laboratories in Kahuta to carry out his research which was later renamed as Dr. A.Q. Khan Laboratories.

- 17. What is the contribution of Dr. Samar Mubarak Mand to Nuclear Technology?**

Ans: He worked in nuclear instrumentation, nuclear diagnostics, laser, fibre optics technology and missiles technology. He worked as member of Pakistan Atomic Energy Commission.

- 18. Give the origin of science.**

Ans: The world science has originated from a Latin word meaning "to be aware of" or "to know". The ancient man had been applying science in many fields. He had been

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involved in the breeding of best varieties of crops and livestock by the selection of best individuals and then reproducing them for the next generations.

19. Define science.

Ans: It is branch of knowledge which is based on facts, experimentation and observations performed in a systematic way to solve the problems of man and quest of exploring the universe.

20. What are the drawbacks of science?

Ans: With the invention of modern weapons of defence and development in nuclear oriented booms, man's survival on earth has become more insecure. New inventions of transportation, entertainment and comfort has not only caused much of human population to become psychological patients but also reduced the value of human's emotions and feelings. As whole all these developments in science has made man more materialistic.

21. How earlier scientists contributed to Astronomy?

Ans: Many nations remained involved in the advancement of this field in old days of human history like Chinese, Egyptians, Babylonians and Muslims. They studied those heavenly bodies which can not be seen with naked eye. These were the earlier scientists who established concepts of days, weeks, months and years on the basis of their studies. Islamic system of Hijri is also based on the lunar motion.

22. How telescope is Important in Astronomy?

Ans: It is the telescope due to which the advancement in the modern astronomy became possible. It is used to see the distant objects. The studies based telescopes are more statistical and accurate.

23. Give some examples of chemical phenomena.

Ans: Some of examples of chemical phenomena are acid base titrations, change of physical appearance of water with temperature, rusting of iron, release of oxygen and absorption of carbon dioxide by plants, burning of candle

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and occurrence of acid rains.

24. How physics is important in all fields of science?

Ans: Physics is a very important component of science because it deals with the equipments which are used in all disciplines. These telescopes, radio, television, tape recorders, radars, computers, digital watches, cameras, microscopes, digital rain gauges and laser related equipments.

25. What do mean by technology?

Ans: Technology is the application of any scientific principle, law or finding for the welfare of human being. Agriculture, medicine, engineering (including the development of industries of vehicles, electronics, communication, computers, drugs, construction and military weapons) are all examples of technology.

26. Science is not concerned with one's feelings. Comment.

Ans: It is rightly said because there is no a formula, method or procedure in science to calculate, evaluate and analyze moral and spiritual values. For this sake we still have to rely upon our customs and old traditions.

27. How engineering is important in water resource conservation?

Ans: Engineering is a very important component of water resource development because construction of dams, barrages, canals and similar structures is possible only by the application of engineering.

28. How atomic energy is used for constructive purpose?

Ans: The constructive use of atomic energy is its application in the power production. In almost all the countries which have got the atomic power, nuclear power generation plants are established. In Pakistan first similar plant is established at Karachi.

29. What is the role of biochemistry in medical sciences?

Ans: Biochemistry deals with all chemical compounds related

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to living organisms. So in medical sciences formulation of all the antibiotics and vaccines, study of structure and functions of different essential compounds of living body and their sources of production involve biochemistry.

30. Give some famous examples of engineering.

Ans: Pyramids of Egypt, Great Wall of China and Karakoram highway are the great examples of engineering.

31. Define agriculture. How it is important.

Ans: "Agriculture is the science, art and industry of managing the living natural resources including plants, animals and microbes in the best use of man". Agriculture deals with the production, storage and initial processing of food which is the first need of man to survive on earth. So nations developed in this field are "dumping off" the grains while those not developed are leaving their people to starve.

32. Define Zoology. What areas it covers?

Ans: "Zoology is a field of biological sciences dealing with the study of animals". It covers all aspects of animals including histological, cellular, ecological, genetic, fossil and physiological etc.

Section-IV

Objective Questions

and Answers

a) Chose the most appropriate choice:

1. Ibne Baitar is famous for his scientific work in:

- | | |
|-------------|------------|
| a) Insects | b) Geology |
| c) Virology | d) Plants |

2. Bu Ali Sina contributed in:

- | | |
|--|---------------------|
| a) <input checked="" type="checkbox"/> Arithmetics | b) Statistics |
| c) Geology | d) Nuclear sciences |

3. Diseases of crops are controlled by:

- | | |
|----------------|----------------|
| a) fertilizers | b) antibiotics |
|----------------|----------------|

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- ☒ e) pesticides ☐ e) irrigation
4. Dr. Abdus Salaam was a:
a) chemist ☒ b) physicist
c) musician d) philosopher
5. The science of earth is:
a) astronomy ☒ b) physics
c) engineering ☒ d) geology
6. Life is originated from:
☒ a) water b) plants
c) mountains d) animals
7. Ibne Baitar did not worked in:
a) plants ☒ b) zoology
c) botany d) pharmacy
8. In Europe Bu Ali Sina is called:
☒ a) Avicenna b) Aristotle
c) Sikandar d) Al-Hazem
9. Dr. Ashfaq worked in AEC for:
a) 08 years ☒ b) 10 years
c) 12 years d) 14 years
10. Jabar Bin Hayyan did not discovered the techniques of:
a) sublimation b) distillation
b) evaporation ☒ c) filtration
11. Bu Ali Sina wrote about _____ books.
a) 50 b) 80
☒ c) 100 d) 150
12. Al-Balroni died in:
☒ a) 1048 b) 1047
c) 1047 d) 1148
13. _____ science is one of the main divisions of science.
☒ a) physical b) mechanical
c) chemical d) geological
13. Ibn-ul-Halham was born in:
a) 964 ☒ b) 965

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- c) 966 d) 967
15. Ibn-ul-Haitham died in:
a) 1037 b) 1038
c) 1039 d) 1040
16. Jabar Bin Hayyan was born in:
a) 622 b) 622
c) 722 d) 822
17. Muslim period of scientific process starts from:
a) 500 b) 600
c) 700 d) 800
18. Following is the scientist of Greek period:
a) Darwan b) Archimedes
c) Issac d) Einstein
19. Science is Latin word meaning:
a) to look b) to invent
c) to formulate d) to know
20. Scientific process is divided into ____ periods:
a) 2 b) 4
c) 6 d) 8
21. Muhammad Ibne Zakariya died in:
a) 930 b) 940
c) 950 d) 960
22. Ibn-ul-Haithum is known as Al-Hazem in:
a) Africa b) Europe
c) Middle east d) china
23. In Europe Bu All Sina is called:
a) Aristotle b) genius
c) Avicenna d) Philosopher
24. Ibn-ul-Haitham is called as father of:
a) chemistry b) optics
c) telescopes d) mirrors
25. Bu All Sina also music in his famous book:
a) Al-Shifa b) Al-Zaitoon
c) Al-Qudrat d) Al-Qanun Filtib

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26. Work on lenses was done by:
a) Haitham ☒ b) Al-Baironi
c) Zakaria d) Baitar
27. Jabar Bin Hayyan is called father of:
a) physics ☒ b) biology
c) lenses ☒ d) chemistry
28. Soil condition is improved by the application of:
☒ a) fertilizers b) pesticides
c) pheromones d) fungicides
29. Zoology deals with:
☒ a) plants b) flora
☒ c) animals d) fruits
30. Botany deals with:
☒ a) plants b) animals
c) human d) birds
31. Agriculture and medicine are related to:
☒ a) chemistry b) physics
c) geology d) astronomy
32. History of science is as old as:
☒ a) man b) Christian era
c) agriculture d) life
33. Blood as a circulatory fluid was discovered in:
☒ a) 1000 b) 1100
c) 1200 d) 1300
34. Dr. Ata-ur-Rehman has wrote more than:
☒ a) 200 b) 300
c) 400 d) 500
35. Astronomy deals with:
a) mountains ☒ b) soils
c) oceans ☒ d) heavenly bodies
36. Rusting of iron is a _____ phenomena.
a) physical b) biological
☒ c) chemical d) non-spontaneous

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37. Dr. Samar Mubarak is the chairman of:
a) ☒ NESCOM b) AEC
c) WTO d) GCISC
38. Telescope was invented by:
a) Marconi b) ☒ Galileo
c) Newton d) Bohr
39. Muhammad Ibne Zakariya was a great:
a) physicist b) ☒ physician
c) chemist d) astronomist
40. Al-Baironi discussed _____ motions in his book Qanoon-I-Masoodi.
a) ☒ lunar b) atomic
c) rotatory d) accelerated

Answers:

1. d	2. a	3. c	4. b	5. d
6. a	7. b	8. a	9. b	10. c
11. c	12. a	13. a	14. b	15. a
16. c	17. c	18. b	19. d	20. b
21. a	22. b	23. c	24. b	25. a
26. b	27. d	28. a	29. c	30. a
31. a	32. a	33. a	34. a	35. d
36. c	37. a	38. b	39. b	40. a

Section-V

TEST YOUR MEMORY

Fill in the blanks and True or False questions are not included in the examination paper. However the same are being given for Memory Test of students.

a) Fill in the blanks:

- Science has been derived from a Latin word that means "to know".
- Changes in the life style of mankind in the twentieth

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- century are due to advancements in Science.
3. Basic subject of the Holy book "QURAN" is the man.
 4. According to saying of prophet it is the duty of every Muslim men and women to acquire knowledge.
 5. Aristotle Achilles and Galen are the scientists of Greek Period of scientific process.
 6. Genetic engineering is a field of science that has been introduced in Recent period of scientific process.
 7. Chemical compounds like sulphuric acid, nitric acid and hydrochloric acid have been invented by Jabir bin Hayyan.
 8. _____ and _____ are the books written by Muhammad Ibne Zakariya Al-Razi.
 9. Al-Bairuni discussed Astronomy related to _____ motion in his book "Qanoon-i-Masoodi".
 10. More than 100 books have been written by the Muslim scientist _____ including "Al-Shifa" and "Al-Qanun Filtib".
 11. Circulation of blood in the human body was discovered in 13th century by _____.
 12. Dr. Abdus Salaam was awarded Noble Prize for proposing a theory called _____.
 13. AEC stands for _____.
 14. Kahuta Research Laboratories have been renamed as _____.
 15. Dr. Ata-ur-Rehman has been awarded _____ for his work in chemistry and 200 research papers.
 16. First telescope was invented by _____.
 17. Science related to Earth is known as _____.
 18. Pesticides are used for the control of conventional _____.
 19. Pyramids situated in _____ and Great Wall of China are the great examples of engineering.
 20. Modern communication facilities have turned the world into a _____.
 21. Agriculture and medicine are the integrated parts of _____ sciences.

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22. Drugs have been formulated by the advancements in the field of _____.
23. Al-Baironi written more than _____ books.
24. GCISC is abbreviated for _____.
25. Dr. Samar Mubarak Mand was awarded Sitara-e-Imtiaz and _____.
26. Galaxies are the collection of _____.
27. _____ was the first to use opium for anaesthesia.
28. The scientific process has been divided into _____ periods.
29. The first chairman of Pakistan Atomic Energy Commission was _____.
30. Biological sciences include the sub-branches i.e. _____ and _____.
31. Muslim period of scientific research ranges between _____.
32. _____ can be produced from nuclear energy as a peaceful use.
33. Marconi is a scientist of _____ period.
34. Genetic engineering is a field of _____.
35. Crystallization technique was first discovered by _____.
36. Zakaria used opium for _____ for the first time.
37. Ibn-ul-Haitham was born in _____.
38. Kitab-ul-Hind is written by _____.
39. More than _____ books are written by Bu Ali Sina.
40. Botany and _____ were the fields of Ibne Baitar.
41. Dr. Abdul Qadeer Khan worked on enrichment of _____.
42. "Atom for peace" is the motto of _____.
43. First telescope was invented in _____.
44. Physics deals with _____ and _____.
45. Modern _____ has brought has turned the world into global village.

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46. Maximum food production on sustainable basis is the aim the _____ sciences.
47. Great Wall of China is a great example of _____.
48. First source of knowledge wisdom in Islam is _____.
49. Maximum scientific development took place in _____ century.
50. Aristotle is a scientist of _____ period
51. First chairman of AEC was _____.
52. Sub-branches of geology are _____ and _____.
53. Al-Qanun Filtib is a book of _____.

Answers:

1. Latin	2. Science
3. The man	4. Prophet (PBUH)
5. Aristotle, Archimedes and Galen	6. Recent
7. Jabar Bin Hayyan	8. Al-Havi, Al Mansoori
9. Solar and Lunar	10. Bu Ali Sina
11. Ibn-e-Afees	12. Theory of Unification
13. Atomic Energy Commission	14. A.Q. Khan Research Laboratories
15. Sitara-e-Imtiaz	16. Galileo
17. Geology	18. Diseases
19. Egypt	20. Global village
21. Biological sciences	22. Biochemistry
23. 150	24. Global Change Impact Studies Centre
25. Hifal-e-Imtiaz	26. Stars
27. Muhammad Ibne Zakariya	28. Four
29. Dr. Munir Ahmad Khan	30. Botany, Zoology
31. 700-1300	32. Electricity
33. Modern	34. Biological sciences
35. Jabar Bin Hayyan	36. anaesthesia
37. 965	38. Al-Bairuni
39. 100	40. Pharmacy
41. Uranium	42. Dr. Abdul Qadeer Khan

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43. 1610	44. Matter, energy
45. Communication	46. Agriculture
47. Engineering	48. QURAN
49. Twentieth	50. Greek
51. Dr. Munir Ahmad Khan	52. Geophysics, Geography
53. Medicine	

b) Indicate the True/ False Statements:

1. The fossil study of plants is called Botany. *False*
2. Islam teaches the mankind to be faithful to Allah and only acquire the knowledge of religion. *False*
3. According to "QURAN" life was created from water. *True*
4. Genetic Engineering is the branch of biological sciences that deals with the modifications in the genetic basis of life. *True*
5. Medicine is a sub-discipline of Physical sciences. *False*
6. Rusting of iron is a geological phenomenon. *False*
7. Geological Survey of Pakistan is an organization investigating the underground resources. *True*
8. Soil, rocks, minerals, oil and gas are studied in Astronomy. *False*
9. Science has also been helpful to evaluate the spiritual values of human beings. *False*
10. By the discovery of antibodies and vaccines, diseases like cancer, aids and hepatitis have been fully eliminated. *False*
11. Dr. Ata-ur-Rehman is a famous nuclear engineer. *False*
12. Hussain Ibrahim Jamal Institute of Chemistry is situated in Islamabad. *False*
13. Properties with matter and energy and their relationship are studied in physics. *True*
14. Pyramids of Rome are the greatest examples of engineering. *False*
15. Dr. Ashfaq Ahmad was awarded the highest civil award

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of Nishan-i-Imtiaz. *True*

Answers:

1.	False	6.	False	11.	False
2.	False	7.	True	12.	False
3.	True	8.	False	13.	True
4.	True	9.	False	14.	False
5.	False	10.	False	15.	True



2

Our Life & Chemistry

Section-I

Introduction to Chapter

Contents: Main topics covered in this chapter are:

- Percentage of Some Important Elements Present in Our Body.
- Process of Respiration.
- Process of Photosynthesis.
- Allotropy and Allotropic Forms of Carbon.
- Organic Compounds, Their Sources and Uses.
- Solvent Properties of Water.
- Facts about Maximum Water Density at a Specific Temperature.
- Composition of Air.
- Role of Different Air Gases, Elements in Environment, Our Daily Life and Agriculture.
- Types of Iron.
- Compounds of Sodium And Potassium and Their Uses.

Concepts:

➤ Why to study chemistry of life?

The branch of chemistry that deals with living organisms is called biochemistry. In this field we deal with different chemical compounds, their relative percentages in different body tissues, chemical reactions, break down of chemical compounds and their ultimate fate in the body. The study of this branch is important because whenever we plan to cure some disease with the help of medicine, we first have to ensure the chemical and physical behaviour of that medicine in the body. By getting this type of information we can easily assess the effects of its use on human body. The medicine is only used against the disease if it is not harmful.

The study of biochemistry is also important to get knowledge about the fate of food ingredients. This helps the food technologists to recommend a balanced diet for man.

Our body functions are running just like a machine. For the proper functioning of machine it is important to know about its requirements and working phenomena. Similarly our body is a machine in which several chemical processes are taking place which are important to be known for maintaining its proper functioning.

➤ Why some food ingredients are required in very large and some in small amounts?

The elements which are required in large amounts are those which are required for the formation of the compounds which are either required for the building of tissues or involved in the availability of energy. On the other hand those elements required in small amounts are those which are required to assist different metabolic reactions or act as co-factors and work with enzymes. These are mostly the minerals and vitamins.

Section-II

Comprehensive Questions with Answers

1. What are the three basic elements essential for life?

Ans: The three basic elements necessary for the maintenance of life are Oxygen, hydrogen and carbon.

Importance: These three elements are present in many compounds, which are consumed by organisms as well as are the parts of their bodies. These compounds include water, air and food ingredients like carbohydrates, proteins, fats and vitamins. These compounds along with mineral elements are vital for the survival of life on earth. The total quantity of all of these elements is fixed in nature but they are recycled in different forms. During this process of recycling they live in living bodies than become a part of the non-living environment after death. These elements become available to the life through some biological processes like respiration and photosynthesis.

Percentage in Human Body:

a) Oxygen 65% b) Hydrogen 18% c) Carbon 10%

2. Define and describe processes of respiration and photosynthesis.

Ans: Respiration and photosynthesis are the basic processes through which energy becomes available to the living organisms.

Respiration:

Definition: "Respiration is a complex process of oxidation and reduction reactions aimed to produce energy, result from the physical phenomena of oxygen inhalation and carbon dioxide exhalation".

Explanation: In this process oxygen travels through the lungs and taken up by the blood from where it is transferred to the

whole body tissues and cells. Here it is used in the oxidation of food ingredients like carbohydrates to produce energy and release carbon dioxide and water. This carbon dioxide is again carried to the lungs through blood from where it is exhaled out to the external environment.

Photosynthesis:

"It is a biological process of combining water and carbon dioxide into carbohydrates by chlorophyll in the presence of light".

Explanation: It is the reverse process of respiration. In this process the solar energy is captured by the plants using chlorophyll to convert it into chemical energy. This chemical energy is not only used up by the plants for their own survival but also used up by the animals. So animals depend on the plants for food. In addition to food oxygen released as a by-product of photosynthesis is also used by the animals in the process of respiration.

3. What is allotropy? Give different allotropic forms of carbon.

Ans: Allotropy:

Definition: "The allotropy is the phenomenon in which an element is found in different forms which have same chemical properties but different physical properties due to difference in the arrangement of atoms in space".

Allotropes Of Carbon:

Carbon has different allotropic forms but most important of which are diamond and graphite.

Diamond: It is the hardest form of stone found on earth. It is made up of hexagons of carbon atoms connected to each other through strong covalent bonds.

Properties and Uses:

- a) Its melting point is 3500°C.
- b) It does not conduct electricity.
- c) It is used in drilling, grinding and glass cutting devices.

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- d) It is extensively used in jewellery as an extremely costly gem.

Graphite: It is also an allotropic form of carbon but is much different in physical properties from diamond.

Properties and Uses:

- a) It is lustrous metallic, soft and black solid.
- b) It is a good conductor of electricity.
- c) It is used as an electrode in electrolysis.
- d) It is used as a lubricant in machines.
- e) It is used in the formation of lead pencils.

4. Differentiate between graphite and diamond.

Ans: Graphite and diamond are different from each other in many physical properties and uses. These two are compared in the following points:

Differences Between Graphite and Diamond:

- a) Diamond is colourless in its pure state while graphite is greyish black in colour.
- b) Diamond is transparent and shiny while graphite is opaque.
- c) Naturally diamond is very hard while graphite is soft and slippery.
- d) Diamond cannot be cut into pieces with knife while graphite can be cut into pieces with the help of knife.
- e) Diamond does not conduct electricity while graphite is a good conductor of electricity.
- f) Diamond is mostly used in jewellery while graphite is mostly used as an electrode.
- g) Extra high temperature converts diamond into graphite while graphite remains unchanged.
- h) Diamond is made up of hexagons while graphite is formed of layers of hexagones.

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- i) Diamond contains only one type of bonds i.e. sigma bond, while graphite contains two types of bonds i.e. sigma and pie bonds.

5. What are organic compounds? Give a brief history along with the occurrence of organic compounds.

Ans:

Organic Compounds:

Definition: "The organic compounds are the chemical compounds in which carbon is present as an essential element".

History: There are numerous compounds present on earth which are organic in nature especially the organic compounds making living bodies are most important. In the past the concept was established that the organic compounds can only be prepared in the living bodies like plants and animals and cannot be synthesized. This idea remained established since long time.

Work of Wohler: There was a scientist named Fredrick Wohler who proved in 1828 that the organic compounds could be synthesized in laboratories by preparing Urea (an organic compound) from simple in-organic compounds.

Occurrence Of Organic Compounds:

- a) The organic compounds are found in following entities:
- b) Living organisms are composed of many organic compounds.
- c) Different dyes, medicines, leather, fiber and drugs are composed of organic compounds.
- d) All types of our food contain organic compounds like carbohydrates, proteins, vitamins, fats etc.
- e) Papers consist of cellulose, which is organic.
- f) All paints are plastics are organic in nature.
- g) Washing substances like detergents and soaps.
- h) Plastic casing of different equipments like computers, televisions, radios and household equipments.

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- i) Petroleum used for combustion purposes in the form of petrol, diesel, CNG etc.
- j) The lubricants like grease used to reduce the friction in different parts of machines.
- k) All forms of coal.

6. Why water is said to be universal solvent?

Ans: Water is called as a universal solvent because it can dissolve a wide range of substances in it.

- Human life is depending on water. Water is so much important for our lives that we cannot live without water for some days. This is because in majority of the transportations of substances in our body water is used as a solvent. Even it participates in some of the chemical reactions.
- The respiratory gases are dissolved in water and become available for aquatic life so all the aquatic life depends on solvent properties of water.
- When rain comes on the land it dissolves many mineral nutrients in it from rocks, mountains and hills. These minerals then become available to the plants in the agricultural fields through irrigation water. In this way yield is enormously increased.
- All the mineral nutrients present in the soil or supplied as fertilizers first dissolve in water and then transported to the plants through specialized tissues called xylem vessels. This is because these minerals cannot directly travel to the leaves, flowers, fruits and other parts of the plant body.
- Different chemicals are dissolved in water in industry.
- Water is used to dissolve many polar reactants in order to carry out some reactions due to its solvent properties.
- Water is used to cook food of any type.
- Water is necessity for the digestion of every type of food that we eat.

7. Why ice floats on water surface? How this property is necessary for the survival of aquatic life?

Ans: The density of each substance increased with decrease in temperature but the density of water increases up to 4°C and then it starts decreasing again. When water becomes ice below 0°C its density is decreased with an increase in volume. This makes it lighter than water so it starts floating on the water surface.

Importance for Aquatic Life:

This characteristic is very much important for the survival of aquatic life in the cooler areas of world. On the onset of winter, temperature of these areas drops below freezing point. This makes the upper layers of water cooler in lakes etc. making them heavier than the lower layers of water. This causes these heavy water layers to move downwards making lower less dense layers to come up. This process continues until the temperature of the whole lake becomes equal to 4°C. When the upper layers become further cooler they become lighter and do not move downwards due to the presence of cooler heavier layers below. On further decrease in temperature the upper layers make ice. This ice floats on the water surface and acts as an insulator so that temperature of the lower surfaces does not decrease. If this proper of water would not be present the whole lake water become ice and all aquatic life die.

8. What is the importance of different gases present in air? Also give the composition of air.

Ans: Air is composed of many gases which are necessary for the maintenance of ecosystems on earth.

Air Composition: Air consists of 78% nitrogen, 21% oxygen, 0.94% argon and rare gases, 0.03% carbon dioxide and ammonia and ozone in traces along with variable amount of water vapours.

Role of Air Gases:

Nitrogen: It plays the following roles.

- a) **Control of Combustion:** Nitrogen is a very unreactive gas. It neither burns nor helps the burning process so it

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limits all the combustion process. Its absence would result in combustion of all the combustible materials on earth.

- b) **Biological Nitrogen Fixation:** It is the biological process in which some microbes living in the roots of some plants convert the air nitrogen into absorbable compounds like nitrate ions which can be directly absorbed by the roots of plants.
- c) **Atmospheric Nitrogen Fixation:** It is a process in which nitrogen is first converted into nitrogen oxides that react with rainwater. This rainwater comes on earth and makes nitrogen available to plants.
- d) **Nitrogen as a Building Material:** The plants for the formation of proteins use up Nitrogen in the form of nitrate ions, which is the structural material of living bodies. This protein made by the plants is also used up by the animals for their own protein formation. These animals secrete nitrogenous wastes in the form of urea, uric acid etc.
- e) **Manufacture of Urea Fertilizer:** Atmospheric nitrogen is used by man for the formation of ammonia, which is further used for the formation of urea fertilizer.

Oxygen: It is also a very important element of air. It is also essential for the maintenance of life on earth.

- a) **Respiration in Animals:** Oxygen is used up in the respiration process in which oxygen is taken up by the animals through inhalation from lungs where it combines with blood to form oxyhaemoglobin. This addition compound supplies oxygen to each and every cell and tissue of the body through arteries and capillaries.
- b) **Biological Energy Production:** Oxygen is used for the oxidation of food for the production of energy along with the production of water and carbon dioxide. The living bodies for the performance of various processes of life and also for keeping the bodies warm use the energy which is produced in this process.

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- c) **Combustion:** It is oxygen, which helps in the combustion of various compounds like coal, petrol, wood and diesel etc. for the production of energy used by man in various activities like cooking processes and industrial activities.
- d) **Fermentation:** Oxygen is also needed in the processes of fermentation and rusting.

Carbon dioxide: It is also a very important gas of air.

- a) **Photosynthesis:** It is the process in which plants use the solar energy for the chemical reaction of carbon dioxide and water for the production of carbohydrates and oxygen. These carbohydrates are the ultimate food for all the life on earth.
- b) **Maintenance of Earth Temperature:** The envelope of carbon dioxide covers the earth and stops the maximum radiations that would reflect back to space otherwise. This property of carbon dioxide is responsible for the maintenance of temperature on earth.

Ozone: It is one of the important gases of air. It is present at 31km height from earth. It performs a very important function of absorbing and shielding ultraviolet radiations coming from the sun to earth. These radiations destroy the living cells and tissues of soft body organisms and cause skin cancer and other diseases in human and higher animals.

9. **Which elements form the living bodies? What are the functions of these elements in maintaining our health?**

Ans: The living bodies are composed of many elements. The most important of these are sodium, calcium, phosphorous, iron, iodine, fluorine etc. Some important features related to these elements are:

Sodium:

It is required in very large amounts.

Its deficiency may cause stroke and irregular heart beat.

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Man takes it through table salt with food, which also contains chlorine.

Calcium:

- a) It is needed for growth and formation of teeth and bones.
- b) Our body skeletal system consists of 99% of calcium.
- c) Its sources are milk, milk products, vegetables, meat and fruits.
- d) Its large quantities are required during growing stage.
- e) Its deficiency caused pain of muscles and softness of bones and teeth.

Phosphorous:

- a) It is also required for the formation, growth and development of bones.
- b) It increased hardness and strength of bones and teeth.
- c) It controls joints and muscles activities.
- d) Its deficiency causes stiffness of joints, bones are made brittle and their growth is badly affected.

Iron:

- a) It is an important element found in haemoglobin of animal's blood.
- b) It is the oxygen carrier and is responsible for its transportation to each and every cell and tissue of the body.
- c) Its deficiency causes anaemia.
- d) It is abundantly found in our liver.
- e) Its sources are egg yolk and meat.

Iodine:

- a) It is needed in small amount by our body.

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- b) The production of thyroxin hormone produced by thyroid gland depends on iodine.
- c) Thyroxin hormone plays important role in the growth of our body.
- d) Mental and physical growth is retarded in the absence of this hormone.
- e) Its deficiency may cause dryness of body and thickness of skin.
- f) Its deficiency lead to early aging, ugly look of body and disfiguring of face.
- g) A disease called goitre may be caused by the deficiency of this element.

10. Write a note on the elements, which are important in agriculture.

Ans: There are many elements, which are required by the plants for proper growth and development and thus important in agriculture. Some of them are:

Potassium:

It is a very important elements required by plants. Its common features are:

- a) It is normally deficient in soil so applied through chemical fertilizers like potassium chloride (potash), potassium sulphate and potassium nitrate.
- b) Potassium sulphate is mostly recommended for horticultural crops, tobacco and potatoes.
- c) Potassium is recommended for fruits and vegetables.

Calcium:

- a) Plants require calcium for proper growth.
- b) It added in the soil in the form of gypsum.

Phosphorous:

- a) Its sources for plants are soil and micro-organisms.

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- b) It plays important role in the accumulation and then release of biological energy in the cellular metabolism.
- c) Crop production is decreased by its deficiency.
- d) There are phosphorous fertilizers, which are available in the market to fulfill its deficiency.

Magnesium:

- a) It is present in the chlorophyll of the leaves of plants, which is an essential character in the process of photosynthesis.
- b) By its deficiency photosynthetic process is adversely affected thus decreasing the production of the crop.

Iron:

Some vegetables and cereals contain this element.

It is present in the soil as a minor element.

Its deficiency causes chlorosis in plants (i.e. yellowing of leaves).

11. What is the importance of iodine and chlorine in our daily life?

Ans: These two elements are very important in our daily life and play many functions. They are used in various ways by man.

Iodine:

- a. **Photography:** It is used in colour photography for the formation of dyes.
- b. **Pharmaceuticals:** Pharmaceutical chemicals contain this element.
- c. **Antiseptic:** It is used as an effective antiseptic.
- d. **Medicine:** It is used in the formation of medicinal compounds like sodium iodide and potassium iodide.
- e. **Chemistry:** Iodine is a very important element used in the analytical chemistry in different forms.

Chlorine:

- a) **Water Purification:** It is used in the purification of water used for drinking purpose.
- b) **Germicide:** It is used to kill germs.
- c) **Insecticides:** It is used in many insecticides called chlorinated insecticides like DDT and BHC.
- d) **Polymers:** It is used to prepare plastic polymers such as synthetic rubber and polyvinyl chloride.
- e) **Medicine:** It is used to make medicinal compounds such as sodium chloride and calcium chloride.
- f) **Organic Compounds:** Many organic compounds such as carbon tetrachloride are prepared using chlorine.
- g) **Bleaching Agent:** Cotton, Linen and wood pulp is bleached using chlorine.

12. How Iron is important in our daily life? Give its forms on the basis of purity.

Ans: Iron play an important role in the formation of many modern types of equipment that man has designed for himself for his use. Its extraction from ores is a very high temperature process carried out in the blast furnace.

Forms of Iron:

Iron is divided into four types on the basis of purity.

Pig Iron:

- a) It is the most impure form of iron.
- b) Its impurities are manganese, phosphorous and sulphur.
- c) It is the hard and brittle form of iron.
- d) It is further converted into cast steel and iron.

Cast Iron:

- a) Its source is Pig iron.
- b) It is brittle.

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- c) It cannot be welded or forged.
- d) Its tensile strength is low.
- e) Its main uses include the formation of railing, lampposts, stoves, cookers and radiators.

Wrought Iron:

- a) It is the most pure commercial form of iron.
- b) When cast iron is heated in furnace it is converted into wrought iron.
- c) It does not contain impurities.
- d) It is soft.
- e) It is also very tough and malleable.
- f) It can be welded and forged.
- g) Its main uses are formation of agricultural implements, nails, chains, iron rods and sheets.

Steel:

- a) It is iron alloy.
- b) Pig Iron is converted into steel.
- c) It is a hard, tough and strong form of iron.
- d) A non-rusting material called "stainless steel" is made from steel.
- e) Stainless steel is used to make many things like cutlery, scissors, saws, machinery and permanent magnets.

13. Give the importance of calcium and magnesium in our daily life.

Ans: These two elements are very important in our daily life. Their functions and importance can be given as follows:

Calcium:

It is a very important element used in the formation of different elements.

Quick Lime:

It is chemically calcium oxide and is also called

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unbujhachuna or lime. Bleaching powder is made from this chemical. Cement and glass is prepared using this substance. It is also used in the processing of sugarcane.

Lime Stone:

It is chemically calcium carbonate and is also called as marble in common language. Its main use is the preparation of quick lime, cement, glass and washing soda.

Gypsum:

It is chemically calcium sulphate. Calcium phosphate and Plaster of Paris is formed using gypsum.

Magnesium:

- a) **Alloys:** Alloys like magnalium and duralumin are prepared with different elements including magnesium. As these alloys are light and strong so they are used in the formation of pistons of motor engines, electric equipments, aircrafts and balances.
 - b) **Magnesium Powder:** It is used in the military star shells, light signals and flash lights.
 - c) **Magnesia:** It is chemically magnesium oxide and is used in preparing firebricks.
 - d) **Medicines:** It is used in some medicines like hyperacidity controller.
 - e) **Purgative:** Magnesium sulphate is used as a purgative.
 - f) **Teeth Filler:** Teeth are filled using magnesium chloride.
14. Give the importance of Sodium. What are the uses of different compounds of sodium and potassium in our daily life?

Ans:

Importance of Sodium:

Sodium has significant importance in our daily life.

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- **Cooling Agent:** Sodium is used as a coolant in reactors.
- **Lamps:** Lamps for street lighting are formed using sodium vapours.
- **Chemicals:** Sodium is used to form chemicals like sodium cyanide and sodamide.

Importance of Compounds of Sodium:

- a. **Caustic Soda:** Chemically it is sodium hydroxide.
It is used in the preparation of soap, paper and artificial silk.
It is used for the purification of vegetable oil and petroleum.
- b. **Washing Soda:** Chemically it is sodium carbonate.
It is used to soften hard water.
It is used in the baking.
It is used in the manufacture of soaps, glass papers and detergents.
- c. **Baking Soda:** It is sodium bicarbonate in chemical composition.
It is used in the manufacture of nitric acid.
It is a good fertilizer.
- d. **Chile Salt Peter:** It is sodium nitrate.
Photographic films are developed and printed.

Compounds of Potassium:

- a) **Potassium bromide/iodide:** These are as medicine as sedative for the removal of nervousness and to induce sleep.
- b) **Use in Photography:** They have use in photography.
- c) **Chrome Alum:** It is used in chrome tanning and as mordant in dyeing of fibres.

- d) Potassium dichromate: It is used in the formation of tannery compounds.

Solved Exercises of Text Book

1. Complete the following statements.

- Carbon dioxide is necessary for the life of _____.
- Percentage of oxygen element in our body is _____.
- The physical properties of allotropes are _____.
- The water has maximum density at _____.
- Oxygen is responsible for _____ all types of fuels.

Answers:

i)	ii)	iii)	iv)	v)
plants	65%	different	4°C	burning

2. Tick (✓) the following statements either True or False:

i)	Diamond and graphite are impure forms of carbon	False
ii)	All types of paper are made of cellulose.	True
iii)	Nitrogen is very reactive and does not control the combustion process.	False
iv)	Potassium is essential for plants as sodium is for animals.	True
v)	Pig iron is the purest form of iron.	False

3. Encircle one choice a, b, c or d in each case:

- i) The average percentage of iron in human body is

16%

b) 18%

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c) 20%
Ans: 18%

d) 22%

ii) **Diamond is the allotropic form of carbon, which is hardest.**

a) slightly soft

b) softest

c) slightly hard

d) hardest

Ans: Hardest

iii) **Two major constituents of air are:**

a) Nitrogen and carbon dioxide

b) Nitrogen and oxygen

c) Carbon dioxide and oxygen

d) Oxygen and argon

Ans: Nitrogen and oxygen

iv) **Which gas is responsible for fermentation?**

a) Oxygen

b) Nitrogen

c) Carbon dioxide

d) None of these

Ans: Oxygen

v) **Which element is found in chlorophyll?**

a) Sodium

b) Calcium

c) Iron

d) Magnesium

Ans: Magnesium

4. **Define and explain respiration and photosynthesis.**

Ans: See Q. No. 2 for answer.

5. **Define allotropy and explain different allotropic forms of carbon.**

Ans: See Q. No. 3 for answer.

6. **Justify statement "water is a universal solvent".**

Ans: See Q. No. 6 for answer.

7. **Describe the role of nitrogen and oxygen in air.**

Ans: See Q. No. 8 for answer.

8. **Describe the importance and application of sodium metal and its compound in daily life.**

Ans: See Q. No. 14 for answer.

9. Describe the different forms of Iron.

Ans: See Q. No. 12 for answer

10. Explain the importance of iodine for our life.

Ans: Importance of Iodine:

- a) It is needed in small amount by our body.
- b) The production of thyroxin hormone produced by thyroid gland depends on iodine.
- c) Thyroxin hormone plays important roll in the growth of our body.
- d) Mental and physical growth is retarded in the absence of this hormone.
- e) Its deficiency may cause dryness of body and thickness of skin.
- f) Its deficiency lead to early aging, ugly look of body and disfiguring of face.
- g) A disease called goitre may be caused by the deficiency of this element. In this disease the thyroid gland becomes enlarged which is present in the front part of neck.

11. What is importance of phosphorous for our health and in agriculture?

Ans: Importance of Phosphorous In Our Health:

- a) It plays important role in the accumulation and then release of biological energy in the cellular metabolism where it is present in the energy rich compounds i.e. Adenosine Triphosphates (ATPs).
- b) Together with calcium it is essential for the formation of bones and teeth.
- c) It is a constituent of co-enzymes, nucleic acids and nucleo-proteins.
- d) It is essential for the formation of phospho-lipids.

Importance of Phosphorous In Agriculture:

- a) Crop production is decreased by its deficiency. This

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- is because it is essentially required for the formation of energy rich compounds i.e. ATPs.
- b) Phosphorous is important in the cellular metabolism of plants.
 - c) There are phosphorous fertilizers, which are available in the market to fulfill its deficiency.

12. Describe the importance of chlorine in daily life.

Ans: Importance of Chlorine In Our Daily Life:

- i. **Bleaching Agent:** Cotton, Linen and wood pulp is bleached using chlorine.
- ii. **Water Purification:** It is used in the purification of water used for drinking purpose.
- iii. **Germicide:** It is used to kill germs.
- iv. **Insecticides:** It is used in many insecticides called chlorinated insecticides like DDT and BHC.
- v. **Polymers:** It is used to prepare plastic polymers such as synthetic rubber and polyvinyl chloride.
- vi. **Medicine:** It is used to make medicinal compounds such as sodium chloride and calcium chloride.
- vii. **Organic Compounds:** Many organic compounds such as carbon tetrachloride are prepared using chlorine.

Section-III

Short Questions with Answers

1. How almost all the animals depend on plants for their survival?

Ans: Plants are the organisms which produce food in the forms of carbohydrates. All the animals to get energy for the functioning of their body systems consume this food. If there would be no plants there would not be the availability of food for the animals so they would not survive on earth. That is why plants are also called as

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the primary producers.

- 2. Plants also respire and need carbon dioxide but not the oxygen from their environment. Why?**

Ans: Plants absorb carbon dioxide from their external environment, which is an essential input in the process of photosynthesis. During this process a large amount of oxygen is produced. Some of this oxygen is retained by the plant, which is actually used up in the process of their respiration while extra oxygen is released in the environment.

- 3. Why different allotropic forms of an element are different in their physical properties?**

Ans: All the allotropic forms of an element are different in their physical properties because the arrangement of the atoms of that element is different in its different allotropic forms. This leads to difference in their structural formula.

- 4. All the allotropic forms of an element have same chemical properties. Why?**

Ans: The chemical properties of an element depend on the chemical composition. Because all the allotropic forms of an element contain the same atoms so their chemical properties are also same.

- 5. What are the living sources of organic compounds?**

Ans: The living sources of organic compounds include plants for getting food, shelter, wood as fuel, fibre etc. and animals from where we get meat, eggs etc.

- 6. How fossil fuels are the organic compounds obtained from the living sources?**

Ans: There were plants and aquatic animals that got buried deep into the soil after their death. Due to a long process and action of high temperature, high pressure and microbial activity they were converted into the fossil fuels. So it is rightly said that the sources of these fossil fuels are living.

- 7. Define the process of photosynthesis.**

Ans: Photosynthesis is a biological process of combining

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water and carbon dioxide by chlorophyll in the presence of light to produce carbohydrates.

8. Define the process of respiration.

Ans: Respiration is a complex process of oxidation and reduction reactions aimed to produce energy, involving the physical phenomena of oxygen inhalation and carbon dioxide exhalation.

9. Can we call inhalation and exhalation process as respiration?

Ans: Inhalation and exhalation are the mechanisms in which air is taken in and out of lungs respectively while respiration is a complex metabolic process taking place inside the cells of body. So we cannot call the processes of inhalation and exhalation as respiration.

10. How oxygen is important in biological Activities?

Ans: Oxygen is the basic input used for the oxidation of food for the production of energy along with the production of water and carbon dioxide. The living bodies for the performance of various processes of life and also for keeping the bodies warm use the energy produced in this process.

11. What is biological nitrogen fixation?

Ans: Biological nitrogen fixation is the biological process in which some microbes (bacteria) living in the roots of leguminous plants convert the air nitrogen into absorbable compounds like nitrate ions which can be directly absorbed by the roots of plants.

12. What is the importance of organic compounds?

Ans: Organic compounds are the most abundant compounds of an element found on earth. They are used by man in many ways like food, fibre, fodder for animals, shelter, clothing and fuel.

13. Why Wohler's work is important in organic chemistry?

Ans: Wohler prepared the first organic compound under the laboratory conditions. This gave an idea to the other

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scientists that other organic compounds can also be prepared in the laboratory. This led to the laboratory preparation of many organic compounds.

14. What are different alloys of magnesium?

Ans: There are many alloys of magnesium. Magnesium and duralumin are prepared with different elements including magnesium. As these alloys are light and strong so they are used in the formation of pistons of motor engines, electric equipments, aircrafts and balances.

15. Why nitrogen is said to be the building element of body of organisms?

Ans: The body of living organisms is made up of proteins. As nitrogen is the essential component of proteins so nitrogen may be said as the building element of living bodies.

16. Why carbohydrates are said so?

Ans: Carbohydrates are said so because they are formed of carbon and also water and oxygen which are present in the same composition as in water.

17. Give a brief account of oxygen cycle.

Ans: Oxygen is first produced by plants during the process of photosynthesis. This oxygen is released in the environment from where it is absorbed by animals. The animals use it in the process of respiration converting it into carbon dioxide (containing oxygen element). This carbon oxide is again taken up by plants.

18. Why diamond is a non-conductor of electricity?

Ans: Diamond is a non-conductor of electricity because it does not contain free electrons. These are the free electrons whose flow actually make electricity flow possible.

19. How water is important for the absorption of salts by plants?

Ans: Water is important for the absorption of salts by plants. This is because the salts get dissolved in the water which is then taken up by plants by passive flow. This flow of

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water also carries salts along into the plant tissues.

20. How water is important in the process of respiration of aquatic plants?

Ans: The solvent properties of water are important for the process of respiration of aquatic plants. The respiratory gases i.e. oxygen and carbon dioxide get dissolved in water from where these are exchanged with the aquatic plants.

21. Why ice made in a fridge by keeping water in a container has dome shaped upper surface?

Ans: When water is placed in the fridge with smooth surface its temperature start decreasing. When this temperature start decreasing after 4°C it expands. For expansion it has no choice except being increased in the upper direction. This is why it upper portion expands making a dome.

22. Air contains 78% of Nitrogen still we add Nitrogen fertilizer in the soil. Why?

Ans: The nitrogen present in the atmosphere is present in the elemental form. The roots of plants cannot absorb it in this form. So we make fertilizers in which nitrogen is present in the forms absorbable to the roots of plants.

23. Why one leguminous crop should be sown in the fields every year or in two years?

Ans: There are some bacteria that live the roots of leguminous plants, which convert atmospheric nitrogen into absorbable form. If these crops are sown once each year it increases the availability of nitrogen in the soil and it becomes more fertile.

24. Why haemoglobin is important in respiration?

Ans: Haemoglobin is a blood protein which absorbed oxygen from lungs and transport it the cells where respiration take place. Carbon dioxide being produced as a by-product of respiration is again attached by haemoglobin that transports it to the lungs for exhalation into the external environment.

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25. Magnesium is a necessary element required for the trapping of solar energy by plants. Why?

Ans: Magnesium is the basic element required in the chlorophyll formation. This is the chlorophyll that traps the solar energy and converts it into chemical form.

26. Why ozone layer in the atmosphere is beneficial for life on earth?

Ans: Ozone layer acts as a shield for dangerous ultraviolet rays coming from sun to earth. These rays if reach on earth cause the death of soil microbes and skin cancer in animals and human beings.

27. Why magnesium alloys are used for aircraft's manufacturing?

Ans: The alloys of magnesium like magnalium and duralumin are not only durable and strong but also light in weight. These do not erode easily.

28. Why sodium carbonate is used for washing?

Ans: The property of sodium carbonate is that it dissolves fats and other oily wastes from the clothes etc., which are then removed by water.

29. Graphite conducts electricity. Why?

Ans: This is because graphite contains free electrons. The flow of these free electrons caused an electric current to flow through the graphite. Due to this property graphite is used for the preparation of electrodes used in electrolysis.

30. How maximum density of water at 4 C° affects on aquatic life in cold areas?

Ans: In cold areas, there is snowfall during winter. This causes the upper surface of lacks to be frozen. The ice of upper lack surface acts as an insulator and does not allow cold to penetrate into the lower surfaces of lack thus keeping aquatic life living.

31. Give six most important elements found in living organisms.

Ans: The most important six elements found in the living

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organisms are hydrogen, carbon, nitrogen, oxygen, phosphorous and sulphur.

32. What is the role of carbon dioxide in the maintenance of earth temperature during night?

Ans: Carbon dioxide provides a green house effect and does allow the radiations to be reflected back to the space thus maintaining the temperature at night.

33. How minerals and salts reached to plain agricultural areas from mountains?

Ans: The rainwater and that being melted from glaciers dissolve the salts and minerals into it and then transport them to the plain agricultural areas.

34. What is the use of chlorine for controlling of agricultural insect pests?

Ans: Chlorine is used for the formulation of insecticides like DDT and BHC. These insecticides kill the insects of crops.

35. What is the function of insulin hormone in the animal's body?

Ans: Insulin hormone produced by thyroid gland is essential for the conversion of extra glucoses into glycogen. This glycogen is then converted into glucose again at the time of their requirement.

36. What are the deficiency effects of phosphorous in human body?

Ans: The deficiency of phosphorous causes mostly skeletal abnormalities. In general joints become stiff, bones become brittle and their growth is affected.

37. What is meant by chlorosis?

Ans: It a plant symptom in which the leaves become yellow. This condition is mostly caused due to the deficiency of iron.

38. Give the names of some important compounds, which are prepared from chlorine.

Ans: Many important compounds are prepared from chlorine like chloroform, carbon tetra-chloride, hydrochloric acid

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etc.

- 39. Why the disease called Goitre is mostly present in the people living in mountainous areas?**

Ans: The water in mountainous areas is mostly deficient in iodine. This deficiency of iodine leads to the disease goitre.

- 40. What is the most refined and purest form of iron metal?**

Ans: The most refined form of iron metal is wrought iron. It is the purest commercial form, which has least impurities. Due to its purity it is soft and malleable.

- 41. Name the organs of body involved in the process of respiration.**

Ans: The organs of body involved in the process of respiration are nose, pharynx, larynx, lungs and diaphragm. All of these parts necessary for the exchange of respiratory gases between body and the external environment.

- 42. The deficiency of magnesium causes stunted growth in plants. Why?**

Ans: Magnesium is the central element of chlorophyll. The deficiency of this element causes the deficiency of chlorophyll thus affecting the process of photosynthesis. Due to inefficient photosynthetic process less food is prepared causing plants to be stunted.

Section-IV

Objective Questions

and Answers

- a) Chose the most appropriate choice:**

- 1. The percentage of oxygen in human body is:**

- a) 21% ☒ b) 65%
c) 78% d) 10%

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2. The process of taking in oxygen and exhaling out carbon dioxide is called:
a) Catabolism b) metabolism
☒ c) respiration d) Photosynthesis
3. During photosynthesis solar energy is converted into following energy:
a) light b) mechanical
c) electrical ☒ d) chemical
4. The respiration is reverse process of:
a) Photometry b) Glycolysis
c) Anabolism ☒ d) Photosynthesis
5. The percentage of carbon present in our body is:
a) 30% b) 78%
☒ c) 18% d) 10%
6. The existence of elements in different physical forms is called:
☒ a) Allotropy b) 2
c) Allilotropy d) Polytropy
7. Diamond is purest form of:
a) Hydrogen ☒ b) Carbon
c) Calcium d) Sulfure
8. The melting point of diamond is:
a) 350° C b) 2500° C
c) 300° C ☒ d) 3500° C
9. Colour of graphite is:
a) Red b) Black
c) Pink ☒ d) White
10. Percentage of hydrogen in human body is:
☒ a) 10% b) 78%
c) 18% d) 12%
11. In case of colour diamond is:
a) yellow b) red
c) white ☒ d) colourless
12. Wohler prepared urea in:
a) 1882 b) 1728

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34. _____ is used to purify sugar.
a) ☒ Calcium b) Iron
c) Iodine d) Potassium
35. _____ is also present along with carbon in abundant amount in organic compounds:
a) Sulphur b) Nitrogen
c) ☒ Hydrogen d) Phosphorous
36. Cast iron is obtained from:
a) Wrought iron b) Steel
c) ☒ Pig iron d) Commercial iron
37. Iron is present in the egg's:
a) Membrane b) ☒ Yellow
c) Coat d) White
38. Diamond is _____ conductor of electricity.
a) Better b) Good
c) Normal d) ☒ None
39. Percentage of carbon dioxide in air is:
a) 0.003% b) 0.3%
c) 3% d) ☒ 0.03%
40. Biological nitrogen fixation is done by:
a) ☒ Bacteria b) Fungi
c) Virus d) Algae
41. Sodium bicarbonate is used for the manufacturing of:
a) ☒ Carbonic acid b) Nitric acid
c) Sulphuric acid d) Hydrochloric acid

Answers:

1. b	12. c	23. b	34. a
2. c	13. d	24. d	35. c
3. d	14. a	25. b	36. c
4. d	15. c	26. c	37. b
5. c	16. d	27. a	38. d
6. a	17. d	28. b	39. d
7. b	18. c	29. d	40. a
8. d	19. a	30. d	41. b
9. d	20. c	31. a	

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10. a	21. a	32. d	
11. d	22. d	33. b	

Section-V

TEST YOUR MEMORY

Fill in the blanks and True or False questions are not included in the examination paper. However the same are being given for Memory Test of students.

a) Fill in the blanks:

1. Life depends on two processes ~~respiration~~ and *Photosynthesis*
2. Carbon dioxide is released during the process of respiration and used up by plants in the process of _____
3. During photosynthesis _____ energy is converted into chemical energy.
4. _____ is reverse process of photosynthesis.
5. The forms of elements having different arrangement of atoms are called _____.
6. _____ and _____ are two important allotropic forms of carbon.
7. Diamond is _____ form of carbon.
8. The melting point of diamond of diamond is _____ °C.
9. _____ is used in the formation of lead pencils.
10. The colour of graphite is _____.
11. In 1828 _____ prepared Urea in the laboratory.
12. Organic compounds contain _____ as an essential element.
13. Water is the most _____ compound found on earth.
14. Water is called _____ solvent.

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15. We cannot exist without water for more than _____ to _____ days.
16. CO₂ and O₂ are the gases that dissolve in water and used in process of _____ by animals.
17. The industrial water is used to dissolve, _____ compounds.
18. Air is a mixture of different _____.
19. Maximum density of water is at _____ °C.
20. Ice has lower _____ than water.
21. In water the temperature falls and _____ layers of water become denser and move _____ wards.
22. Difference in the density of water and ice is the reason for _____ of aquatic life.
23. By volume _____ percent oxygen is present in air.
24. Two major constituents of air are _____ and _____ gas.
25. Ozone lies about _____ km above the surface of earth.
26. Ozone acts as shield and absorbs _____ radiations coming from sun to earth.
27. Ultraviolet radiations produce _____ and other diseases.
28. _____ is used for the extraction of gold.
29. _____ is the major nutrient element of the soil.
30. Iodine is required in _____ amount by our body.
31. _____ percent of calcium is found in the skeletal system of our body.
32. _____ does not allow the radiations going out of atmosphere.
33. Major constituent of air is _____ gas.
34. Nitrogen controls _____ process.
35. The process of conversion of nitrogen into absorbable form is called _____.
36. Life of animals depends upon _____ gas.

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37. _____ is responsible for burning of all types of fuels.
38. Nitrogen oxides form _____ when react with rainwater.
39. _____ is mostly used for purification of water.
40. _____ is the most impure form of iron.
41. Purest form of iron is _____.
42. Sodium bicarbonate is also called as _____.
43. Chile salt peter is chemically _____.
44. _____ is essential for plants as sodium is for animals.
45. Goitre is caused by the deficiency of element _____.
46. _____ is used in the manufacture of DDT.
47. The hardest known stone found on earth is _____.
48. _____ lamps are used for street lights.
49. _____ is used for the preparation of Plaster of Paris.
50. Sodium hydroxide is also called _____.
51. _____ iron is brittle so cannot be welded or forged.

Answers:

1. respiration, photosynthesis	27. skin cancer
2. photosynthesis	28. potassium cyanide
3. solar	29. calcium
4. respiration	30. very small
5. allotropes	31. 99
6. diamond, graphite	32. carbon dioxide
7. purest	33. nitrogen
8. 3500	34. combustion
9. graphite	35. nitrogen fixation
10. black	36. oxygen
11. Frederick Wohler	37. oxygen
12. carbon	38. nitric acid
13. abundant chemical	39. chlorine
14. universal	40. pig iron
15. three, four	41. wrought iron
16. respiration	42. washing soda
17. chemical	43. sodium nitrate

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18.	gases	44.	potassium
19.	4	45.	iodine
20.	density	46.	chlorine
21.	upper, down	47.	diamond
22.	survival	48.	sodium lamps
23.	20.99%	49.	gypsum
24.	nitrogen and oxygen	50.	caustic soda
25.	31	51.	cast
26.	ultraviolet		

b) Indicate the True/ False Statements:

1. The average percentage of oxygen in human body is 65%.
2. Life depends upon one biological process i.e. respiration.
3. During respiration animal exhale air-containing oxygen.
4. During respiration carbon dioxide is released, which is used up by the plants for metabolism of their body.
5. In photosynthesis carbon dioxide and oxygen react in the presence of sunlight to produce food.
6. The allotropic elements have the same chemical properties.
7. Diamond is the impure form of carbon.
8. Iodine is mostly used for purification of water.
9. Colour of diamond is yellow.
10. Compounds containing hydrogen are called organic compounds.
11. At high temperature diamond changes into graphite.
12. Diamond and Graphite are the two important isotopes of cobalt.
13. The fossil fuels are called as universal solvents.
14. In industry the use of water is to dissolve the chemical compounds.
15. Water can dissolve mineral salts and fertilizers.
16. Water density is maximum at its freezing point.
17. Ice has lower density than water.

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18. The nitrate ions are insoluble in water.
19. Carbon dioxide controls the combustion process.
20. Deficiency of phosphorous in soil is made up using phosphorous pesticides.
21. Iron is a minor nutrient in soil.
22. Diamond is a very good conductor of electricity.
23. Common form of sodium hydroxide is caustic soda.
24. Graphite is a bad conductor of electricity.
25. Melting point of diamond is 350 C°.
26. Sodium vapour lamps are used for street lightening.
27. Potassium cyanide is used for the extraction of gold.
28. Common name of sodium nitrate is Chile saltpeter.
29. Steel is an alloy of iodine.
30. Colour of graphite is white.
31. Down the temperature form 4 Co water molecules begins to take crystalline structures.
32. Most important property of water is electric conductivity.
33. Two major constituents of air are oxygen and nitrogen gases.
34. Graphite is used to make lead pencils.
35. Wrought iron is the purest commercial form of iron.
36. Stainless steel resists against rusting.
37. Our body in large amounts requires iodine.
38. Our body required sodium in small amount.
39. Oxygen is responsible for rusting process.
40. Steel is made form pig iron.

Answers:

1. True	15. True	29. False
2. False	16. False	30. False
3. False	17. True	31. True
4. False	18. False	32. False
5. False	19. False	33. True
6. True	20. False	34. True

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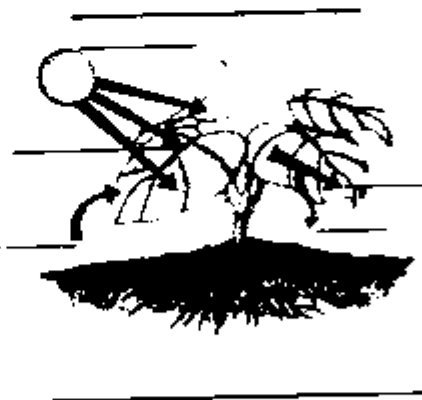
7.	False	21.	False	35.	True
8.	False	22.	False	36.	True
9.	False	23.	True	37.	False
10.	False	24.	False	38.	False
11.	True	25.	False	39.	True
12.	False	26.	True	40.	True
13.	False	27.	True		
14.	True	28.	False		

c) Identify and label the following figures:

Figure 1



Figure 2



5

Microorganisms and Diseases

Section-I

Introduction to Chapter

Contents:

This chapter deals with the following topics.

- Bacterial Diseases, Causes and Cure.
- Main Bacterial Diseases Discussed are Tuberculosis, Whooping Cough, Diphtheria, Tetanus, Cholera, Typhoid.
- Virus and Viral Diseases Including Small Pox, Polio, Aids, Influenza, Measles, Hepatitis.
- Other Diseases Like Cancer, Malaria, Ring Worm, Ascariasis, Thread Worm.
- Sources of Germs Spread.
- Protection from Germs to Avoid Diseases.
- Smoking, Harmful Effects and Associated Diseases.
- Mental Illness and Its Types.
- Use of Different Drugs and Their Bad Effects.

Section-II

Comprehensive Questions with Answers

1. Write a note on different diseases caused by bacteria.

Ans: There are numerous diseases, which are caused by bacteria.

Tuberculosis:

Causal Agent: Mycobacterium

Symptoms:

The patient may show following symptoms.

- a) There might be pain in chest.
- b) There may be blood in sputum.
- c) Coughing which might prolong.
- d) Fever for many days.
- e) Body weight may be lost.

Features of disease:

- i. It is a widespread and long lasting disease.
- ii. Disease is more common in unhygienic areas and in those people who take poor food and breath unclean and polluted air.
- iii. Disease spreads through coughing, sneezing and spitting of T.B. patient.
- iv. Its bacteria are also carried by un-boiled milk.
- v. Lungs are affected in this disease.
- vi. During cough or along with sputum the patient may spit blood in severe cases.

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Preventive Measures:

- i. The environment should be hygienic.
- ii. Persons should be provided with proper hygienic diet, fresh and clean water, fresh air etc.
- iii. Patient of this disease should be kept in isolation to avoid disease spread.
- iv. The treatment of this disease is prolonged and persistent.
- v. Children should be given preventive vaccine BCG against this disease.

Whooping Cough:

This disease is mostly caused in infants.

Symptoms:

- i. A whistling sound called "Whoop" is produced when children cough.
- ii. The capillaries and lining of lungs is affected by acute cough.
- iii. Weakness and reduction in skeleton is common.

Treatment:

The infants are immunized by DPT injections. The following schedule is followed:

Doses	Time after Birth
1 st	6 weeks
2 nd	10 weeks
3 rd	14 weeks
Booster dose	18 months

Composition of DPT:

There are three vaccines in this substance i.e. for, Diphtheria, Pertussis and Tetanus (thus abbreviated as DPT).

Diphtheria:

This disease is found in infants. Its features are:

Features:

- i. Epithelial cells of throat, nose and larynx are attacked by the bacterium.
- ii. The neighbouring cells are killed by a toxic substance produced by the bacterium.
- iii. Larynx and tracheal passages of the patient become non-functional.
- iv. If the heart muscles get weak, patient may die.
- v. Vaccination of infants is the best solution.

Tetanus:

This disease is very dangerous. Its features are:

Features:

The causal bacterium of this disease lives and reproduces in the animal dung.

The entry of the bacterium takes place through the injured skin such wounds and cuts.

A toxic substance is produced by the bacterium which affects the nervous system.

They reproduce very rapidly inside the body.

The patient becomes lazy and feels headache during early stages of this disease.

In the later stages the patient feels difficulty in mouth opening, urination and his neck becomes stiff.

The patient mostly faces death.

Treatment:

- i. There is no treatment of this disease on its occurrence.
- ii. It can be prevented by the injection of Anti Tetanus Serum at the time of injury.

- iii. The immunity can be induced by the periodic injections of preventive vaccines.

Typhoid:

Features:

- i. This disease is more common.
- ii. Antibiotics can control it.
- iii. People can be immunized before the occurrence of this disease by the use of vaccines.

Cholera:

Features:

- i. The causal bacterium causes infection in the stomach.
- ii. Disease is spread through houseflies, which contaminate the food and water.

Symptoms:

- i. Vomiting and diarrhea.
- ii. Dehydration and loss of salts from the body.
- iii. Patient may die due to severe attack.

Treatment:

- i. The disease can be controlled by the use of Oral Rehydration Salt (ORS) and antidiarrheal drugs.
- ii. Vaccines can be used for immunization.

2. What is virus? Give some important diseases caused by viruses.

Ans:

Viruses:

Viruses are very small entities that can be seen only under electron microscope.

Characters:

- i. They are ultra microscopic and their size is measured in millimeters.

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- ii. They cannot be seen under compound microscope.
- iii. Their body is composed of simply a DNA or RNA surrounded by a protein coat.
- iv. They form crystals.
- v. They can reproduce only in the living cells.
- vi. There are diverse shapes and sizes of viruses.
- vii. Some microbiologists consider them to be living organisms due the genetic material present in it but others do not because of their crystalline nature.

Viral Diseases:

Small Pox:

Features:

- i. It is fatal disease.
- ii. Pus filled boils appears on the whole body a symptom of this disease.
- iii. The patient should be isolated from other family.

Treatment:

- i. Only solution of disease is the use of vaccines. This disease has now been eliminated from Pakistan.
- ii. The vaccine of this disease was the first discovered by man in the history of vaccines.

Polio:

Symptoms:

High fever, stiffness in the neck and headache.

Features:

- i. This disease occurs during infant stage.
- ii. In this case lower limbs are affected and the children become disable.
- iii. Disease spreads through air and water.
- iv. Infants are the victims, which are under the age of five.

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- v. Vaccination is the only solution.
- vi. Vaccination is done in regular intervals up to the age of five years.
- vii. Oral drops of vaccines are available.
- viii. UNICEF funded campaign has been launched by the government of Pakistan so that to eradicate the disease from the country.

Influenza:

Symptoms:

Mild fever, irritation in the nasal openings, nasal flow and redness of eyes.

Features:

- i. The causal agent is influenzal virus.
- ii. It is not a fatal disease.
- iii. It spreads through air.
- iv. Only drugs and complete rest can reduce the intensity of disease.
- v. Disease automatically diminishes after four to five days.

Measles:

Features:

- i. It is a common disease of infants.
- ii. Initially patient suffers from fever and cough.
- iii. At later stages small boils appears on face and chest.
- iv. The boils are gray in colour and have red circles around them.
- v. Disease diminishes within ten days.
- vi. Once patient is recovered from the disease. he becomes immune against the disease.
- vii. Now a days infants are being immunized against this

disease.

Aids:

The term AIDS stands for Acquired Immunity Deficiency Syndrome. This disease has been a big threat to mankind. This disease is highly fatal.

Features:

- i. Its causal virus is HIV that stands for Human Immunodeficiency Virus.
- ii. This virus destroys the immune system of man by destroying the white blood cells.
- iii. Various other diseases occur due to this disease. These diseases include T.B., Pneumonia, Typhoid etc. This is because the natural immune system of the body is destroyed.
- iv. Sources of spread of disease are contaminated syringes, blood transfusion and direct contact with the patient.

Treatment:

Any work on the treatment of this disease is still under experimental stage.

Hepatitis:

The virus of this disease attacks the liver.

Symptoms:

Jaundice, abdominal pain, fever, loss of appetite, liver enlargement and fatigue.

Features:

- i. There are three types of this disease i.e. Hepatitis A, Hepatitis B and Hepatitis C.
- ii. The virus destroys the liver cells.
- iii. The disease is controlled if the immune system is activated otherwise it proves to be fatal.
- iv. The disease spreads through blood, mother's milk and

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saliva.

- v. The contact of faces can also be a source of spread of this disease.
- vi. Vaccines are not still discovered for its type C.
- vii. Type A and B of Hepatitis can be controlled through vaccination.

3. Write a note on cancer.

Ans:

Cancer:

"This disease is due to uncontrolled growth of cells which form a cyst or a tumor".

Features:

- a) This disease is associated to the uncontrolled growth of cells.
- b) The cancerous cells may stay at one place or they might spread in the whole body through the circulation of blood.
- c) The cancerous cells can be removed through surgery if they stay at one place.
- d) If the cancerous cells spread in the whole body it becomes cureless and leads to death of patient.
- e) Mostly disease occurs on lungs, breasts, intestine, mouth and skin.

Causes of Disease:

The causes of this disease may be physical, chemical and biological. More common factors are:

- a) There are some dangerous ultraviolet sunrays that may cause this disease.
- b) Cancer can also occur due to certain drugs.
- c) Some viruses also cause this disease.
- d) Cancer of mouth and lungs might be caused by smoking.

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- e) This disease can also be caused by tin packed foodstuff.
- f) Some chemicals also cause this disease.

Symptoms:

- a) Loss of weight due to long indigestion.
- b) Cough with swelling of throat.
- c) Vomiting and headache.
- d) Appearance of a wound, which is persistent.
- e) Tumour appears under the skin.

Diagnosis:

The disease should be diagnosed by different tests like blood tests, biopsy and sonography.

Treatment:

There are three methods to treat this disease:

- i. **Chemotherapy:** It is the use of medicines to cure the disease.
- ii. **Surgery:** It is the early treatment. In this case the tumour is removed by the procedure of surgery.
- iii. **Radio Therapy:** There are some radiations, which are used to kill the cells of cancer. This method is faster and gives more favourable results.

Principle of Treatment:

This disease can be cured more affectively if treated at the early stages.

- 4. Give symptoms, causes and control of malaria, ring worm, ascariasis and thread worm diseases.**

Ans:

Malaria:

Causal Agent:

An organism of phylum Protozoa called Plasmodium causes this disease.

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Features:

- i. Third world countries i.e. countries of Asia and Africa are under the attack of this disease.
- ii. The females of Anopheles mosquitoes spread this disease. The insect bites man and leaves its saliva in the body of man which is full of the germs. Once these germs are inside the body they multiply rapidly and destroy the red blood cells.

Treatment:

There is a drug called quinine which is very effective against this disease. If the person is not administered for a long time, he becomes pale and weak.

Precautions:

- i. All the breeding places of mosquitoes should be destroyed. The larvae of mosquitoes grow in the ponds of standing water and ditches so they should be emptied.
- ii. Some suitable insecticide should be sprayed at houses and drains.
- iii. The houses and offices should be screened.

Ring Worm:

Features:

- i. This is a skin disease, which is caused by a fungus.
- ii. The hyphae of fungus penetrate into the skin of patient forming ring like structures.
- iii. This disease causes itching and un-comfort of the body.

Treatment:

There are some anti-fungal skin creams and ointments which should be used to eliminate this disease.

Prevention:

- i. The disease can be avoided by keeping environment clean.

- ii. Fields should not be visited bare footed.
- iii. Regular bath should be taken.

Ascariasis:

Features:

- i. This disease is common in the dirty and unhygienic areas of world.
- ii. It is an intestinal disease.
- iii. It is more common under the age of eight years.
- iv. Its causal agent is a worm called *Ascaris lumbricoides*.
- v. The worm has pointed ends and is long cylindrical in shape.



A Roundworm

Cause of Disease:

This disease is caused when small eggs of the worm are taken in through food, water or dirty hands.

Symptoms:

- i. The children affected by the disease become weak and pale in colour.
- ii. The patient undergo the deficiency of vitamin A that adversely affect the vision.
- iii. The worms move in the body from one place to other place and cause appendicitis, jaundice, and pneumonia.

Precautions:

The house should be kept clean.

The sewage and faeces should be disposed properly.

Hands should be cleaned before eating any thing.

Boiled water should be drunk.

Children should not be allowed to eat soil.

fruits etc. should be properly washed before consumption.

Thread Worm:

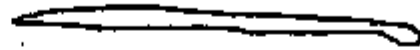
Features:

A worm called threadworm causes this disease.

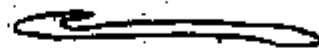
The female of worm lays eggs around the anus.

It causes itching and the patient scratches the affected area.

The eggs of the worm attach to the fingers of affected children and cause re-infection.



A female worm



A male worm

Treatment and Precautions:

- i. The infected children should be provided with drugs to kill the worms.
- ii. Hands should be washed before every meal.
- iii. Bed of infected child should be treated with some antiseptic.
- iv. There should be regular trimming of nails.
- v. The disposal system of faeces should be proper.

5. How germs can spread? Discuss the main sources shortly.

Ans: There are various ways through which germs can spread. These are:

Air:

- i. Most of germs form spores, which are present in the air.
- ii. The germs enter by respiration into the human body from air.
- iii. Germs of T.B. spread through air.

- iv. To prevent the disease it is important that air should be fresh, healthy, dust free.

Water:

- i. Water is one of important sources of spread of germs.
- ii. There are many germs that grow and live on or in water.
- iii. To avoid infection from water, it should be boiled before use especially in those areas where fresh underground water is not available.
- iv. Most common examples of germs spreading through water are those of cholera and diarrhea.

Food:

- i. Food can also be a factor of spreading the disease germs if it becomes contaminated.
- ii. Contaminated food includes rotten fruits, vegetables, spoiled and contaminated food.
- iii. These are a good source of spreading germs.
- iv. Edibles should not be kept uncovered.
- v. Spoiled food cause toxicity.
- vi. Degraded food might be poisonous and cause great trouble in the alimentary canal.

Touch or Direct Contact:

- i. There are many diseases that spread by the direct contact with the patient e.g. Aids, T.B. and plague.
- ii. The direct contact with such patients should be prevented.
- iii. In case of fatal diseases patient should be isolated so that to avoid any chance of physical contact.

Faeces:

- i. The faeces of the patient are a good source of germ.

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spread.

- ii. The faeces can spread the disease germs with the help of air. In this case after getting dry, they spread in the air and transmitted to other healthy persons.
- iii. The faeces should be buried properly in the soil.

Animals:

- i. Animals can also be a good source of spread of disease germs.
- ii. There are many germs that get attached themselves to the animal's body and reach us.
- iii. The antiseptics should be used for the washing and bathing of pet animals.
- iv. The cattle should also be given regular bath to avoid such contamination.

Cuts and Wounds:

- i. We should not leave the wounds open because they can be the source of spread of disease.
- ii. Open body surfaces are the gates of germs from where the germs get entry.
- iii. All cuts or wounds should be washed with some antiseptic material and covered properly with bandage.
- iv. Care should be taken at the time of changing the bandage.

Blood Transfusion:

- i. There are many diseases whose germs spread through blood transfusion.
- ii. Germs of Aids and Hepatitis are transferred through the blood from the patient's body to the healthy people.
- iii. The blood must be checked for the germs of different diseases by some recognized laboratory before transfusion.

6. How we can protect ourselves from the germs? Discuss different methods for controlling them.

Ans: Microorganisms are present where life exists. A huge amount of these germs are harmful to human beings. There are different methods available to control these microbes. Some of these are:

Sterilization:

- i. This method involves the heating procedure.
- ii. Boiling water kills most of the germs present in water.
- iii. All the surgical instruments must be sterilized otherwise infections may occur.
- iv. We must use disposable syringes.
- v. Raw milk contains the germs of several diseases.
- vi. The milk must be boiled before using so that germs present in it would be killed.

Pet Animals:

- i. Animals carry the germs of many diseases.
- ii. If pet animals are kept at home they must be washed regularly.
- iii. Those animals carrying diseases must be killed and buried in the soil.
- iv. In Western countries the pet animals are also vaccinated for immunization against certain diseases just like cattle etc.

Isolation:

- i. The patients suffering from infectious diseases should be isolated from other family.
- ii. The clothes and utensils of such patient should also be isolated.
- iii. Such isolation is not acceptable in our social system but it is helpful to save all the family from the infection.

Cleanliness:

- i. By keeping ourselves neat and clean we can lead a very healthy life.
- ii. We should keep our environment and surroundings clean.
- iii. We should take bath daily, wash our hands before every meal, and clean our teeth twice a day.
- iv. The trimming of nails and cleaning of teeth is of a great importance because many germs keep shelter in the mouth as well as inside nails.
- v. As the germs multiply in the dirty places so we should keep our surroundings clean.

Water Supply:

- i. One of the major sources of spread of diseases is water.
- ii. By boiling water its germs are killed and its drinking becomes safe.

Sewage Disposal:

- i. Area should be kept clean by the proper disposal of sewage and other wastes.
- ii. If proper disposal is not available then it mixes in underground water and utilization of fruits and vegetables become hazardous for our health.
- iii. Our drinking water also becomes contaminated.

Immunization:

If a person is injected with the non-virulent strains of the causal organism of some disease the person becomes immune to that disease.

Antibodies:

- i. - Those substances, which kill the germs, are called as antibiotics.

- ii. When the disease has occurred there is no alternative available other than an antibiotic.
- iii. These have saved the lives of many people till now.
- iv. The antibiotics should only be used after doctor's prescription.

7. Write a short note on smoking?

Ans: Smoking is a bad habit, which causes many fatal diseases. It should be discouraged at any level or in any situation. It is rightly said that it is injurious to health. During smoking some toxic and injurious gasses are released by the cigarette. These gases are inhaled into the lungs where these are diffused into the blood capillaries and become part of blood.

Diseases Caused by Smoking:

There are many diseases for which smoking proves to be the cause. Some of these are:

- i. **a) Respiratory Diseases:** These diseases may affect throat, lungs and windpipe. Some of these diseases might be fatal. One of the most dangerous disease is cancer of lungs. Patient rarely escapes from death from this disease.
- ii. **b) Heart Diseases:** It is observed that rate of cardiovascular diseases is more in smokers than in non-smokers.
- iii. **c) Miscellaneous:** These include cancer, blood pressure, skin diseases and psychological diseases.

It is important to know that a smoker not only injures himself but also his friends and family members which unfortunately inhale the smoke.*

8. What is mental illness? Explain its types and factors.

Ans:

Mental illness:

Definition: "It is the conditions of a person in which his behaviour, activities and relations to others deviate from the

general society".

Explanation:

Sometimes behaviour of some person may become abnormal. In these conditions the activities of that person do not resemble with that of society. Such person is called mentally ill..

Types:

There two types of mental illness.

a. Neurosis:

Definition: "It is the mild form of mental illness in which patient does not loose his sense of responsibility and remains functioning in the society".

Explanation:

In this form of mental illness patient does not acquires an irresponsible behaviour and does not injures him or others. Some times his mental problem is not felt by many people of his relation. Such person does not need hospitalisation and can be cured by simple psychotherapy.

b. Psychosis:

Definition: "It the severe form of mental illness in which patient loses his sense of responsibility and becomes functionless to his society".

Explanation:

This is the advanced form of mental disorder. A person affected in this way becomes injurious to him and others. Such people should be admitted in the hospital and treated with drugs. Sometimes these people are treated with electric shocks as a hope of curing them.

Factors of Mental Disorders:

There might be many factors but some of them are:

- i. **Inherited Factors:** In this type again there might be two factors. Firstly the patient might inherit the mental problem from his forefathers secondly his genes might be changed by some mutations.

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- ii. **Biological Factors:** There might be abnormalities in the secretions of different parts of body or some extra secretions, hormones or neurotransmitters.
- iii. **Social Factors:** Patient might be depressed due to his economic conditions or some other social problems.
- iv. **Physiological Factors:** There may be some brain injury due to many reasons. These include toxicity, use of drugs, prolonged illness, disorders in the neurons responsible for the transmission of nerve impulses etc.

9. Write a note on the use of drugs. Give its abuses.

Ans:

Drugs:

Definition: "Any substance taken in the body to get relief involving some changes in the functioning of our body is called a drug".

Explanation:

All the drugs have negative impact on the brain, body, functioning of body organs, own life and the life of people around the drugs user. A drug is a useful facility to provide relief to our body but when it becomes a habit it is harmful and should be discouraged. This is because the drug user cannot live without the same drug and continue to damage him. So it becomes "abuses".

Addiction:

It is the state at which a drug becomes a habit and drug user cannot live without it.

Example:

There is a drug called Morphine, which is prepared from "Opium", is used to kill severe pain. According to the doctor's advice, if a person uses the drug to get comfort it is useful. But when the person start using the drug to get extra comfort during routine life then a stage, called addiction or abuse of drug, will come when the drug user will feel uncomfortable condition without that drug. So such use of drug is harmful.

Explanation of Addiction:

During the condition of addiction the patient becomes dependent on drug. He tries to take the drug by any means thus creating problems for him, his family and for the whole society.

Examples of Drugs:

Heroin, Bhang, Hashish, Alcohol, Morphine and Pethidine.

Some important features of common drugs of our society along with their drawbacks are:

Heroin:

Physical Form:

It is present in the form of white or brown powder. Its taste is bitter. The addition of many diluents like sleeping pills, sugar, milk or other powders and liquids of daily use is used to dilute it.

Effects:

- i. Brain becomes functionless and person may go to sleep.
- ii. Health is affected.
- iii. It causes a decrease in the breathing and rate of heartbeat.
- iv. Due to less heart beat, blood pressure slows down.
- v. Eye pupils look smaller than before.
- vi. Causes unconsciousness.
- vii. It might lead to death of some person.

Charas/ Hashish:

Source:

This drug is prepared from a wild plant i.e. Cannabis sativa which is commonly known as Bhang plant.

Charas is prepared from the green leaves while Hashish is prepared from the flower tips of this plant. This drug is used

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both as smoke or drinks.

Effects:

- i. It has many hazards on the health of its user.
- ii. Redness of eyes.
- iii. Throat becomes dry.
- iv. The coordinate systems are deteriorated.
- v. Decision making power is lost.
- vi. Person becomes lazy and sleepy.
- vii. Person feels more hunger.
- viii. User of charas may loose his fertility.
- ix. Body parts like mouth, throat and lungs and affected.
- x. Person becomes a burden to the society.
- xi. He losses his interest in the social activities.
- xii. He remains no more useful to the society.

Alcohol:

Sources:

Alcohol is prepared by fermenting fruits, vegetables and grains. These include grapes, barley etc. It is available in the form of tonics or cough syrups.

Effects:

- i. There is always a danger of cancer.
- ii. It may cause heart problems.
- iii. Liver and brain is damaged.
- iv. Person may become dizzy or drowsy.
- v. It causes loss of balanced movements.
- vi. Concentration is lost.
- vii. Headache or nausea or vomiting may be caused if it is constantly used.

Narcotics:

Features:

Those compounds that cause insensibility to internal pain and external stimuli are called narcotics.

Opium, charas or bhang might be the source.

Steps to Eliminate Narcotics:

Government of Pakistan has taken steps and established a force called Anti-Narcotics Force to eliminate the preparation and transport of narcotics.

Solved Exercises of Text Book

1. Complete the following statements:

- One meter is equal to _____ millimeters.
- The tetanus causing bacteria are found on _____.
- A virus can be seen under an _____ microscope.
- Measles is a _____ disease.
- Malaria is caused by a unicellular organism called plasmodium.

Answers:

i)	ii)	iii)	iv)	v)
1000	Animal dung	Electron	Common	Plasmodium

2. Tick (✓) the following statements either True or False:

i)	Most of the germs are killed in the boiling water.	True
ii)	Measles is common disease of old people.	False
iii)	ATS is administered against cholera.	False
iv)	Polio virus can also cause disease to adults.	False
v)	Smoking can cause the cancer of mouth and lungs.	False

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3. Encircle one choice a, b, c or d in each case:

i) All the following diseases are caused by bacteria except.

- | | |
|-------------------|--------------|
| a) Whooping Cough | b) Tetanus |
| c) Diphtheria | d) Hepatitis |

Ans: Hepatitis

ii) Ring worm is caused by.

- | | |
|-------------|-----------|
| a) Bacteria | b) Virus |
| c) Amoeba | d) Fungus |

Ans: Fungus

iii) It is a type of medicine that can kill the germs.

- | | |
|----------------|-------------------|
| a) Anitgen | b) Antibody |
| c) Antibiotics | d) Anticoagulants |

Ans: Antibiotics

iv) Which is following is the disease of digestive tract.

- | | |
|--------------|---------------|
| a) Cholera | b) Tetanus |
| c) Small pox | d) Diphtheria |

Ans: Cholera

v) All the following methods are used to cure cancer except.

- | | |
|-----------------|-----------------|
| a) Chemotherapy | b) Surgery |
| c) Radiotherapy | d) Hydrotherapy |

Ans: Hydrotherapy

4. Explain the useful activities of bacteria.

Ans: Bacteria are useful in many cases like:

- Bacteria live in the roots of leguminous plants causing nitrogen fixation in plants thus adding to their production.
- Bacteria are used for the formation of cheese, yogurt etc. from milk.
- Bacteria also live in soil causing decomposition of dead organic materials obtained from dead animals and plants and convert them into simple compounds. This process not only reduces pollution but also recycles the precious elements.

5. Write a note on diphtheria, tetanus and measles.

Ans: The three diseases are explained below.

Diphtheria:

This disease is found in infants. Its features are:

Features:

- i. Epithelial cells of throat, nose and larynx are attacked by the bacterium.
- ii. The neighbouring cells are killed a toxic substance produced by the bacterium.
- iii. Larynx and tracheal passages of the patient become non-functional.
- iv. If the heart muscles get weak, patient may die.
- v. Vaccination of infants is the best solution.

Tetanus:

This disease is very dangerous. Its features are:

Features:

- i. The causal bacterium of this disease lives and reproduces in the animal dung.
- ii. The entry of the bacterium takes place through the injured skin such wounds and cuts.
- iii. A toxic substance is produced by the bacterium which affects the nervous system.
- iv. They reproduce very rapidly inside the body.
- v. The patient become lazy and feels headache during early stages of this disease.
- vi. In the later stages the patient feels difficulty in mouth opening, urination and his neck becomes stiff.
- vii. The patient mostly faces death.

Treatment:

- i. There is no treatment of this disease on its occurrence.

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- ii. It can be prevented by the injection of Anti Tetanus Serum at the time of injury.
- iii. The immunity can be induced by the periodic injections of preventive vaccines.

Measles:

Features:

- a) It is a common disease of infants.
 - b) Initially patient suffers from fever and cough.
 - c) At later stages small boils appears on face and chest.
 - d) The boils are grey in colour and have red circles around them.
 - e) Disease diminishes within ten days.
 - f) Once patient is recovered from the disease he becomes immune against the disease.
 - g) Now a days infants are being immunized against this disease.
6. Write a comparative note on cancer, its symptoms and treatment.
Ans: See Q. No. 3 for answer.
7. How we can protect ourselves from germs?
Ans: See Q. No. 6 for answer.

Section-III

Short Questions with Answers

1. What do you mean by parasitic microorganisms?

Ans: The parasitic microorganisms means those microorganisms that cause various types of diseases and disorders in the other organism like animals, plants and human beings.

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2. What are the symptoms through which tuberculosis can be identified?

Ans: The main symptoms of tuberculosis are chest pain, constant fever, blood in sputum, loss of body weight and prolonged coughing.

3. Why tuberculosis patient should be kept in isolation?

Ans: The causal organism of tuberculosis spreads through air, physical contacts, food etc. therefore its patient should be kept in isolation to save other family members from the disease.

4. Why DPT injections are administered to the infants at different stages?

Ans: The DPT injections are administered to the infants at different stages so that their body become immune against some of the very dangerous diseases likes tetanus, diphtheria etc. This is done because in case of occurrence of these diseases their treatment is difficult.

5. What are the symptoms of tetanus?

Ans: The causal bacterium attacks the nervous system. The patient feels headache, becomes lazy, and feels difficulty in urination and his neck becomes stiff at early stages of the disease. Eventually the patient dies.

6. Why cholera is known to cause immediate death of the patient?

Ans: In case of cholera, vomiting and diarrhea leads to the loss of water and salts from the body. Due to non-functioning of stomach nothing is digested and absorbed. In these conditions the organs systems are not able to function properly that eventually leads to death in only a few days.

7. What is the composition of DPT?

Ans: There three vaccines in this substance i.e. for Diphtheria, Pertussis and Tetanus (thus abbreviated as DPT).

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- 8. Why some scientists say that viruses are living and some say that they are non-living?**

Ans: Some scientists say that the viruses are living because of the presence of DNA and RNA (genetic material) while others consider them to be dead because they are found in the crystalline form.

- 9. What is the structure of a virus?**

Ans: A virus is a minute particle of very simple structure. It is consisting of a protein tail with RNA or DNA enclosed in a protein coat.

- 10. What are the symptoms of polio?**

Ans: Polio is a very dangerous disease. Its symptoms are fever, headache, stiffness of neck and paralyzed legs in sever cases.

- 12. What are the diseases that may occur along with aids?**

Ans: Aids leads to many diseases and disorders due to lost of immunity. These diseases include tuberculosis, pneumonia, typhoid etc.

- 13. What are the characters of Hepatitis?**

Ans: Hepatitis is a serious viral disease. In case of its occurrence the immunity system of the body becomes activated other wise it proves to be fatal. This disease is characterized by jaundice, abdominal pain, liver enlargement, fatigue, loss of appetite and fever in some cases.

- 14. Give the sources of spread of Hepatitis virus.**

Ans: The virus of Hepatitis spreads through many sources. These include the exchanged of blood, saliva and from mother to the child through breast-feeding. The virus of Hepatitis A can also spread through the face contact with the patient.

- 15. What is the treatment of tetanus?**

Ans: There is no treatment of this disease on its occurrence. It can be prevented by the injection of Anti Tetanus Serum at the time of injury. The immunity can be induced by the

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periodic injections of preventive vaccines.

16. Give the symptoms of whooping cough.

Ans: A whistling sound called "Whoop" is produced when children cough. The capillaries and lining of lungs is affected by acute cough. Weakness and reduction in skeleton is common.

17. Denote the treatment of malaria.

Ans: There is a drug called quinine which is very effective against this disease. If the person is not administers for a long time, he becomes pale and weak.

18. Give the physical features of thread worm disease.

Ans: A thread worm female lays eggs around the anus which is the last part of alimentary canal. The female is also resting in this portion.

19. Denote some precautions to reduce thread worm disease.

Ans: Hands should be washed before every meal, nails should be trimmed, faeces and sewage should be disposed off properly and bed and clothes of affected child should be washed with some antiseptic.

20. What are the agencies of spreading the germs?

Ans: The agencies spreading the germs are air, water, food, direct contact, faeces, animals, accidental openings in body like cuts and wounds and blood transfusion.

21. Give some diseases spread by water along with a suitable precaution.

Ans: There are many diseases spread by water like cholera and diarrhea. These diseases can be prevented by drinking the boiled water.

22. Denote the respiratory diseases caused by smoking.

Ans: These diseases may be caused to throat, lungs and windpipe. Some of these diseases might be fatal. One of the most dangerous disease is cancer of lungs. Patient rarely escapes from death from this disease.

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23. Define neurosis.

Ans: It is the mild form of mental illness in which patient does not lose his sense of responsibility and remains functioning in the society. In this form of mental illness patient does not acquire an irresponsible behaviour and does not injure him or others.

24. Define psychosis.

Ans: It is the severe form of mental illness in which patient loses his sense of responsibility and becomes functionless to his society. He sometimes may injure himself.

25. How mental disorders are related to inheritance?

Ans: In this case again there might be two factors. Firstly the patient might inherit the mental problem from his forefathers secondly his genes might be changed by some mutations.

26. How biological factors and society influence the mental abnormalities?

Ans: There might be abnormalities in the secretions of different parts of body or some extra secretions, hormones or neurotransmitters. Patient might be depressed due to his economic conditions or some other social problems.

27. Give some physiological reasons of mental problems.

Ans: There may be some brain injury due to many reasons. These include toxicity, use of drugs, prolonged illness, disorders in the neurons responsible for the transmission of nerve impulses etc.

28. What are the causes of heart diseases?

Ans: The heart diseases are now becoming more common due to many factors like the habit of smoking, more comfortable life and lack of exercise.

29. Give some diseases caused by smoking?

Ans: Smoking is not only a bad habit but also causes many diseases like the diseases of respiratory tract and heart

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problems. Most of these diseases are fatal under severe conditions.

30. Define a drug.

Ans: Any substance taken in the body to get relief involving some changes in the functioning of our body is called a drug.

31. What is addiction?

Ans: During the condition of addiction the patient becomes dependent on drug. He tries to take the drug by any means thus creating problems for him, his family and for the whole society.

32. Give the source of Charas/ Hashish.

Ans: This drug is prepared from a wild plant i.e. Cannabis sativa which is commonly known as Bhang Plant.

33. How alcohol is prepared?

Ans: Alcohol is prepared by fermenting fruits, vegetables and grains. These include grapes, barley etc. It is available in the form of tonics or cough syrups.

34. Give some features of narcotics.

Ans: Those compounds that cause insensibility to internal pain and external stimuli are called narcotics. Opium, charas or bhang might be the source.

35. What is immunization?

Ans: If a person is injected with the non-virulent strains of the causal organism of some disease the person becomes immune to that disease. This is called artificial immunization.

36. What are the steps taken by government to eliminate narcotics?

Ans: Government of Pakistan has taken steps and established a force called Anti-Narcotics Force to eliminate the preparation and transport of this drug.

37. Give the effects of alcohol.

Ans: There is always a danger of cancer. It may cause problems of heart, liver and brain. Person may become

dizzy or drowsy. It causes loss of balanced movements and concentration.

Section-IV

Objective Questions and Answers

a) Chose the most appropriate choice:

1. Tuberculosis disease is caused by the bacterium called _____.
a) bactinophora b) virus
c) fungi d) ☒ mycobacterium
2. The disease spreads by coughing, sneezing and spitting of _____ patient.
a) diphtheria d) ☒ tuberculosis
c) cholera d) tetanus
3. A whistling sound is produced by infant coughing called _____.
a) ☒ whoop b) tantee
c) acute coughing d) sneezing
4. Booster dose of DPT injection is given after _____ months.
a) 12 b) 16
c) ☒ 18 d) 14
5. Diphtheria is the disease of _____.
a) males b) girls
c) females d) ☒ infants
6. Influenza is a common disease of _____.
a) fishes b) ☒ humans
c) animals d) birds
7. The influenza automatically diminishes after _____ days.
a) 5-6 b) 3-4
c) ☒ 4-5 d) 4-6

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38. _____ reduces the body coordination.
a) medicines b) charas
c) vaccines d) heroin
39. blood pressure becomes low through:
a) hashish b) charas
c) vaccines d) heroin
40. Smoking may cause the _____ of lungs.
a) TB b) hepatitis
c) cancer d) cholera

Answers:

1. d	11. a	21. b	31. a
2. b	12. b	22. d	32. b
3. a	13. b	23. b	33. b
4. c	14. a	24. d	34. c
5. d	15. b	25. c	35. a
6. b	16. d	26. d	36. b
7. c	17. c	27. c	37. c
8. b	18. b	28. b	38. b
9. c	19. d	29. a	39. d
10. b	20. a	30. b	40. c

Section-V

TEST YOUR MEMORY

Fill in the blanks and True or False questions are not included in the examination paper. However the same are being given for Memory Test of students.

a. Fill in the blanks:

41. _____ disease is caused by a bacterium called Mycobacterium.
42. _____ is wide spread and long lasting disease.
43. In tuberculosis mostly _____ are affected.
44. Infants must be immunized with _____ against T.B.
45. Whooping cough can only be controlled by immunizing

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- the infants by the _____ injections.
46. DPT contains _____ vaccines.
 47. In diphtheria bacterium attacks the _____ cells of nose, throat and larynx.
 48. Infants should be immunized against diphtheria by _____.
 49. Tetanus is a _____ but dangerous disease.
 50. Tetanus can be avoided by administering the injections of _____.
 51. _____ are ultra microscopic organisms and much smaller than bacteria.
 52. _____ can be seen under electron microscope only.
 53. The vaccine against _____ was the first to be discovered.
 54. Influenza is caused by the _____ virus.
 55. AIDA is caused by the virus called _____.
 56. Hepatitis is mainly of three types i.e. Hepatitis _____ and _____.
 57. Vaccines are now available for Hepatitis _____ and _____ but not for Hepatitis _____.
 58. _____ is an infectious disease of digestive tract.
 59. _____ is the uncontrolled growth of cells which form a cyst or a tumour.
 60. Cancerous cells may spread in the whole body through _____.
 61. Smoking can cause the cancer of _____ and _____.
 62. A tumour can be removed with the help of _____ at early stage of cancer.
 63. Malaria is common disease of the third world i.e. _____ and _____.
 64. _____ is caused by a unicellular microorganism called plasmodium.
 65. Plasmodium belongs to _____.
 66. Plasmodium transmitted through a mosquito called _____.
 67. _____ is a skin disease caused by a fungus.
 68. _____ is a universal disease of human intestine.

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69. The worm is long and _____ with pointed ends.
70. _____ is mainly caused by germs that travel through air.
71. The germs of _____ and _____ may spread through water.
72. The germs of _____ and _____ are transferred through blood.
73. Most of germs are killed by _____ water.
74. _____ is a type medicine that kills or stops growth of germs.
75. Smoking is _____ to health.
76. _____ are due to a change in gene or a part of DNA.
77. _____ is manufactured through opium.
78. Heroin is white or brown powder with _____ taste.
79. Blood pressure becomes low due to the use of _____.
80. Alcohol is present in some _____ and _____.

Answers:

1. tuberculosis	21. mouth, lungs
2. tuberculosis	22. surgery
3. lungs	23. Asia, Africa
4. BCG	24. malaria
5. DPT	25. animal kingdom
6. three	26. anopheles
7. epithelial	27. ring worm
8. vaccination	28. ascariasis
9. rare	29. cylindrical
10. ATS	30. TB
11. virus	31. cholera
12. virus	32. diphtheria
13. small box	33. boiling
14. influenza	34. antibodies
15. HIV	35. injurious
16. A, B, C	36. inherited factors
17. A, B, C	37. morphine
18. cholera	38. bitter
19. cancer	39. heroin
20. blood	40. tonics, cough syrupss

b) Indicate the True/ False Statements:

1. Mycobacterium is the causal organism of tuberculosis.
2. Headache is symptom of tuberculosis.
3. First dose of DPT injection is given to the infants at the age, of 2 months.
4. DPT injection contains three injections.
5. Diphtheria is disease of old people.
6. A virus is responsible for diphtheria.
7. trachea and larynx of the diphtheria patient become functionless.
8. Tetanus is a very common disease.
9. The tetanus bacterium enters into the body through our diet.
10. The tetanus bacterium produces a toxic substance that effects the nervous system.
11. There is no vaccine for tetanus.
12. There are many antibiotics as well as vaccines for the control of typhoid.
13. Cholera causes vomiting and diarrhea.
14. Cholera is not a fatal disease.
15. Polio is characterized with the loss of immune system of body.
16. The life cycle of influenza organism completes in two weeks.
17. Influenza is a fatal disease of human beings.
18. There are four types of Hepatitis.
19. Cancer is caused by plasmodium.
20. The female of thread worm lives in the anus of patients.
21. DDT is a chemical which is used for the treatment of threadworm.
22. Ascariasis is a bacterium.
23. Ring worm is a disease caused by a fungus.

Answers:

1. True	9. False	17. False
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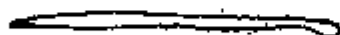
2. False	10. True	18. False
3. False	11. False	19. True
4. True	12. True	20. False
5. False	13. True	21. False
6. False	14. False	22. True
7. True	15. False	23. False
8. False	16. False	

c. Identify and label the following figures:

Figure 1:



Figure 2:





7

Energy

Section-I

Introduction to Chapter

Contents: This chapter will discuss the following topics.

- Definition of Energy.
- Types of Energy.
- Energy Conservation.
- Inter-Conversion of Energy.
- Needs and Availability of Energy.
- Energy Acquiring Methods.
- Energy Sources.
- Renewable and Non-Renewable Sources of Energy.
- Solar House Heating, Structure and Functioning .
- Solar Cells.
- Energy from Wind, Sea, Water Tides, Earth, Biomass.
- Alternative Energy Sources.
- Measurements of Energy.
- Energy Conservation, Needs and Methods.

Section-II

Comprehensive Questions with Answers

1. Define energy. What are its types?

Ans:

Energy:

Definition: "The ability of any thing to do some work is called energy".

Explanation: Energy of the bodies requires some force, which is possessed by it. This force is different in different cases. In case of water it is the height of water which provides the force for the running of turbines.

Types: There are different forms and types of energy depending on its ability, nature and effects produced. Some of important types are:

Mechanical Energy:

Definition: "The energy which is possessed by an object due to its motion or position is called mechanical energy".

Examples: The examples of objects possessing mechanical energy are water running down hill, a fast moving car, strongly moving wind, a compressed or stretched spring, lifted hammer and plough driven by a tractor or bull.

Kinds: There are two forms or kinds of mechanical energy.

Kinetic Energy:

"The energy of any object due to its motion is called Kinetic energy". The rule is that the kinetic energy possessed by a body is more if it is moving with faster speed.

Examples: Moving car, travelling stone in air and movement of water or air etc. are all the examples of the objects possessing kinetic energy.

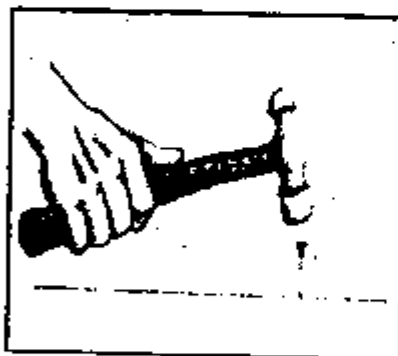


Water Mill

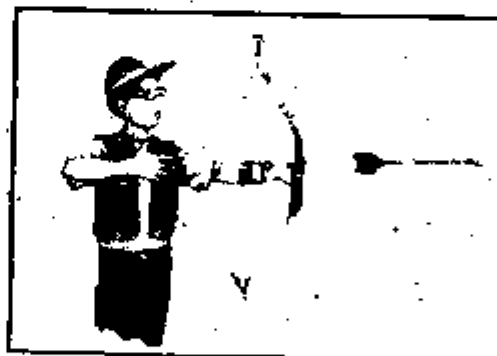
Potential Energy:

Definition: "The energy possessed by an object due to its position is called potential energy". The objects placed at height or present at higher potential possesses this energy.

Examples: The objects having potential energy are water stored at some height, raised hammer, stretched or compressed spring, a stone placed at upper altitude and a raindrop present in the clouds etc.



**A raised hammer
possesses
Potential Energy**



**Stretched bow
also possesses
Potential Energy**

Heat Energy:

Definition: "The energy given out by the hotter bodies to the cooler bodies in the form of radiations is called heat energy".

There are different sources of heat energy.

- a) Main source of heat is sun.
- b) Heat is also achieved by the burning of fuels like

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petroleum, coal and wood.

- c) The friction between two surfaces produces heat energy.
- d) Heat energy is used for the cooking of food.
- e) Food eaten by us is essential for providing heat energy to the body, which is required by us for the maintenance of body temperature and performance of daily activities.

Electrical Energy:

Definition: "The energy which is got through the flow of charged particles is called electrical energy".

- This energy can be obtained from thermal, hydropower or nuclear power plants.
- The electrical energy can also be obtained from chemical reactions of electrolytes by designing specific batteries or cells.
- There are electric generators from where we can also get this energy. On very small level dynamo can be used for its production.
- This energy has enormous uses without the pollution hazards.
- There are wires made up of specific conducting materials, which are used for its transport from one place to another place.

Sound Energy:

Definition: "The energy produced due the vibration of a body is called sound".

- Vibrating any surface like drums, strings, air column or leaves of trees during strong winds etc can produce this type of energy.
- This energy requires some media like air for its transportation.

Light Energy:

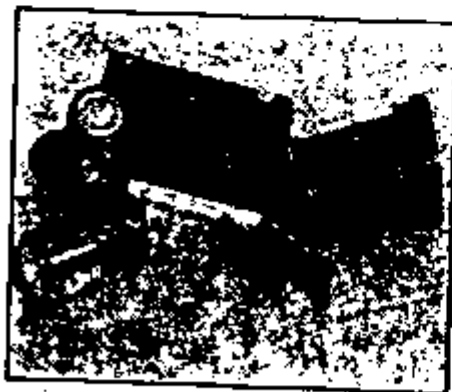
Definition: "The combination of radiations of different wavelengths (constituting seven colours) is called light".

- Light is important for the production of food by plants during the process of photosynthesis on which all the life on earth depends.
- We also need light for watching the things.
- Main source of light is sun. Other sources are the burning of fuels like oils, woods etc., inflorescent materials used in tube-lights, electric bulbs and candles etc.
- It is the artificial light that keeps our cities awaking during night.

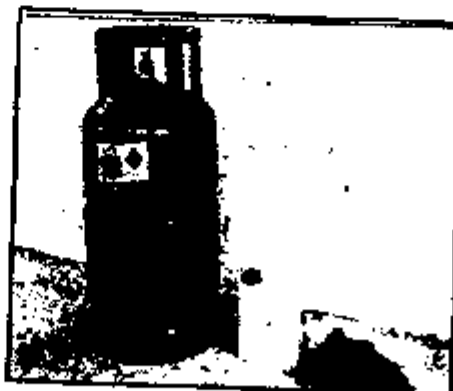
Chemical Energy:



Food as a source of energy



Cell and Batteries



Fuel

Definition: "The energy which is obtained during the chemical reactions is called chemical energy".

- This type of energy is present in foods like carbohydrates, fats etc. and fuels like natural gas, petroleum etc.
- These substances release chemical energy during their chemical reactions like combustion of fuels or digestion and dissemination of food in the living bodies.

Nuclear Energy:

Definition: "The energy produced during the radioactive reactions like fusion and fission is called nuclear energy".

- This gives us heat energy, which is used for the production of electrical energy.
- The heat energy that we get from the sun is the result of nuclear reactions taking in the sun.
- If these chemical reactions are uncontrolled, they lead to the destruction of life.

2. How energy flows in the energy cycle? How energy is inter-converted into different forms?

Ans:

Energy Cycle:

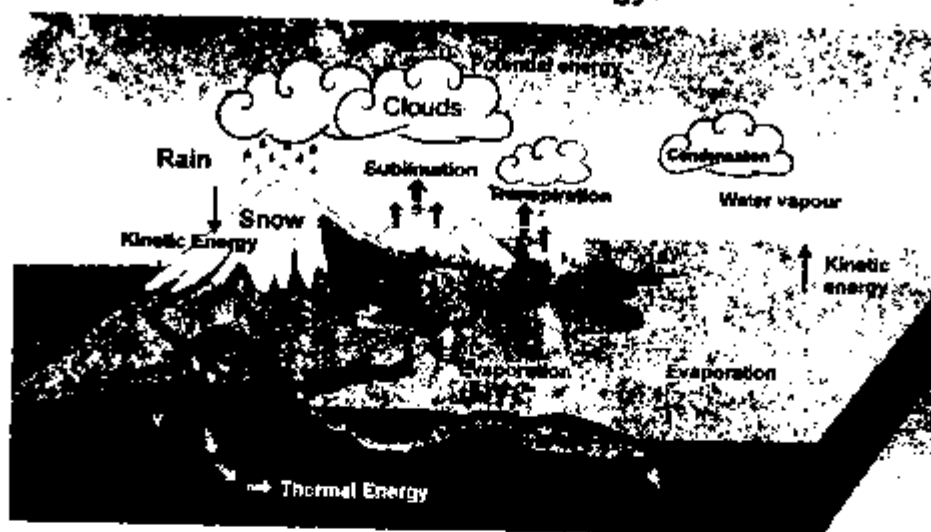
Definition: "An energy cycle means that the energy can be converted from one forms to the other but the total energy remains the same".

Principle: The general principle in this case is "energy can neither be created nor destroyed but it can be converted from one form to the other".

Explanation: As the total energy that we get always remains constant So we can obtain energy for the performance of our activities by its inter-conversion. It is the fact that all the processes being carried out in nature are due to the energy flow from one state to another. When ever this flow will stop all of these processes will stop leading to total disaster.

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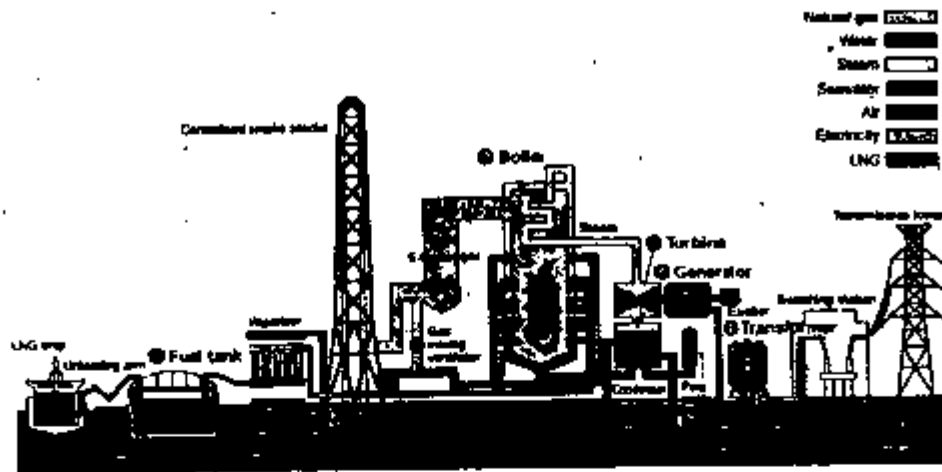
Examples of Inter-conversion of Energy:



Inter-conversion of Energy

- a) When we rub our hands quickly, they become warm. This is because chemical energy causes our muscles to move to produce kinetic energy, which then produces heat energy by the force of friction between the surfaces of our hands.
- b) The nuclear processes being carried out in sun produce heat energy. This heat is absorbed by water of rivers, oceans, streams, lakes etc. and evaporates into the atmosphere. Many water vapours make clouds. When these water vapours cool down they are condensed and acquired potential energy. After condensation these droplets of water become heavy and start coming to the land. This gradually converts potential energy into kinetic energy. Due to kinetic energy these particles have the ability to disturb the soil particles resulting in the soil erosion, breakage of rocks and mountains.
- c) Kinetic energy of water running down hill can be used for the production of electrical energy.
- d) The electrical energy can further be utilized for the production of light, heat and mechanical energy as per required.

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Geothermal power plant diagram

3. **What is the importance of energy? What are its uses in our daily life?**

Ans: The importance of energy in our life is that survival of life depends on energy. There many sources of energy like:

Sources of Energy:

Main sources of energy are wind, petroleum, natural gas, sun, food, fire wood, coal, flowing water, radioactive elements etc.

Importance and Uses of Energy:

Heat: It has been the single source of energy that man has been relying upon from thousands of years. Man used to cook food, get warmth during winter, run steam engines of trains etc. using this heat.

Heat and Mechanical Energy: Heat energy is used in the steam engine, which had been widely used for the transportation purposes in the past years.

Petroleum: After the discovery of petroleum it has diversely been used for the transportation and electricity production purposes. Energy is obtained from petroleum products by their combustion in the internal combustion engines.

Electricity: Today it is basic need of life. There are many aspects of its importance i.e.

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- a) We need electricity for the working of our home appliances like lamps, fans, electric ovens, televisions, radios, air conditioners, refrigerators, heaters, grinders, computers etc.
- b) Electricity is needed by us at schools and offices for the working of computers, telephones and lights.
- c) Our hospitals need electricity for the proper functioning of machinery, which is related to medical and surgery.
- d) Many of our factories need electrical energy for their working.
- e) In agriculture sector electricity is needed for the working of tube-wells, artificial lights, light traps etc.

Energy Needs in Mechanized Agriculture:

In mechanized agriculture, huge amount of energy is needed for the functioning of tractors, harvesters, threshers, highly efficient irrigation systems like drip irrigation etc. In some cases like in rice in some areas sowing is mechanized.

Miscellaneous: We also need Energy in the fields of research for the functioning of electric balances, pH meters etc., telecommunication and entertainment.

Increasing Demand of Energy: With the growth of population the energy requirements of Pakistan are increasing day by day. This is because of two facts i.e. firstly total individuals are increasing and secondly energy needs per individual are increasing. So we have to search out more sources of energy so that we would be able to fulfill the requirements of our nation in the coming years.

4. What are the methods of acquiring energy? Give a brief account of sources of energy.

Ans:

Methods of Acquiring Energy:

There are many methods to get energy. These methods are different in case of different forms of energy.

Heat: Heat is mainly obtained from sun. Its other sources are

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burning of petroleum, natural gas, coal, charcoal, wood etc.

Electricity: It is the backbone of industry. It is produced by hydropower, thermal and nuclear plants.

Mechanical Energy: Different forms of energy are converted into mechanical energy like electricity is converted into it using electric motors; heat energy obtained by combustion of fossil fuels is converted into it by running internal combustion engines, energy of wind and water is directly used for the production of mechanical energy using windmills and turbines. This mechanical energy is used in various fields like industry, agriculture, transportation etc.

Sources of Energy:

There are many sources of energy. Some of these are:

Sun: The ultimate sources of all the energy that we use comes from the sun.

Fossil Fuels: The fossil fuels are very important sources of energy. They are formed thousands of years ago by the burning and decomposition of plants and marine animals. These fossil fuels include natural gas, coal and petroleum. The sources of petroleum are decreasing with very fast rate and being exhausted quickly. If these fossil fuels finish, we will have to search out some other source that would be used in alternation to the fossil fuels. There is no discovered source of energy, which would be able to fulfill all the functions, that fossil fuels do with same cost and efficiency.

Problems In Relation to Fossil Fuels:

There are many problems related to this source of energy.

- a) **Non-renovation:** The present form of fossil fuels has taken millions of years to develop so once they are exhausted there will be energy crisis.
- b) **Pollution:** Carbon dioxide, carbon mono-oxide etc. are the waste products of petroleum that pollute the environment are hazardous for our health.
- c) **Need of Time:** Other sources of energy like radiations

should be developed to meet the energy requirements in case of loss of fossil fuels.

Nuclear Fuels:

Pakistan is one the countries of the world that are also getting energy from nuclear resources. The energy production from the radioactive elements is a complex process called nuclear fission.

Nuclear Fission:

It is a process in which the heavy nuclei like that of uranium and some other radioactive elements are bombarded by neutrons. As a result these nuclei split up into smaller parts and give out energy and more neutrons. The neutrons produced during the process further split the nuclei into parts. If these neutrons were not controlled they would cause blaster so they are absorbed during the process to limit the process.

Wastes of Nuclear Fission:

This process yields huge amount of heat and dangerous waste materials. Both of these pollute the environment.

5. What do you mean by renewable sources energy? Discuss some of them with detail.

Ans:

Renewable Sources of Energy:

Definition: "These include all those sources of energy that are not limited in their use and do not exhaust like fossil fuels".

There are many sources of energy, which can be used without the threat of their running out. Rain water is one of the examples. It evaporates from the oceans, lakes, streams, rivers etc. and converted into clouds. These vapours condense and come on earth as rain. This water eventually converts again into vapours. In this way this cycle continues.

Energy of Water:

Energy is obtained from water in the hydro power plants.

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It is the pollution free source of energy production. For this purpose dams are constructed all over the world.

Dams: Dams are the structures used to store water. These are made at those locations where it is possible to make water flowing down the hill. This energy is then used to run the turbines that convert mechanical energy of water into electrical energy. These dams are also used for irrigation purposes.

Energy from Sun:

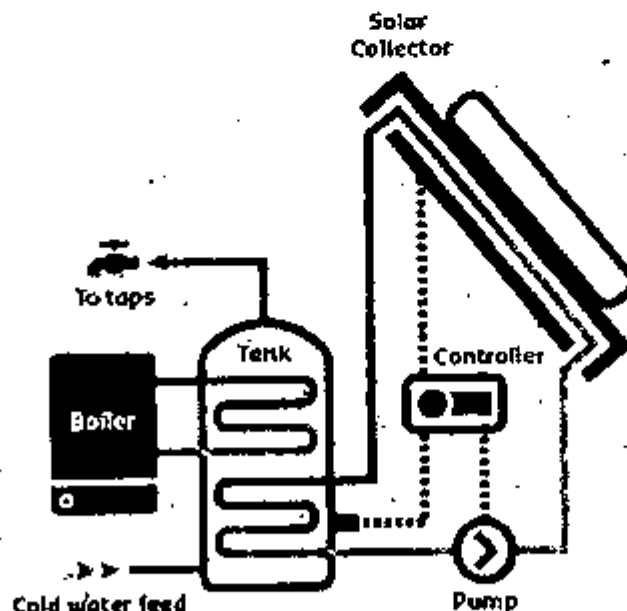
All the life on earth depends on solar energy for fuels and food. Energy is obtained from sun directly or indirectly.

Properties of Solar Energy: Firstly this energy is not harmful to environment in any case. Secondly solar energy is thousand of times more than the requirement by us.

Methods of Using Solar Energy:

Solar energy can be used for the production of electricity and heating of water in the winter season in colder areas.

i) Solar House Heating:



Solar House Heating System

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It is a method in which solar energy is used in the cooler areas for obtaining hot water. For this purpose complete solar house heating system has to be maintained.

Structure of Solar House Heating System:

It consists of three components.

Collector: It is made up of glass panels over blank metal plates. These metal plates are used to absorb the energy of sun. This heat is then used to warm the liquid flowing in the collector pipes.

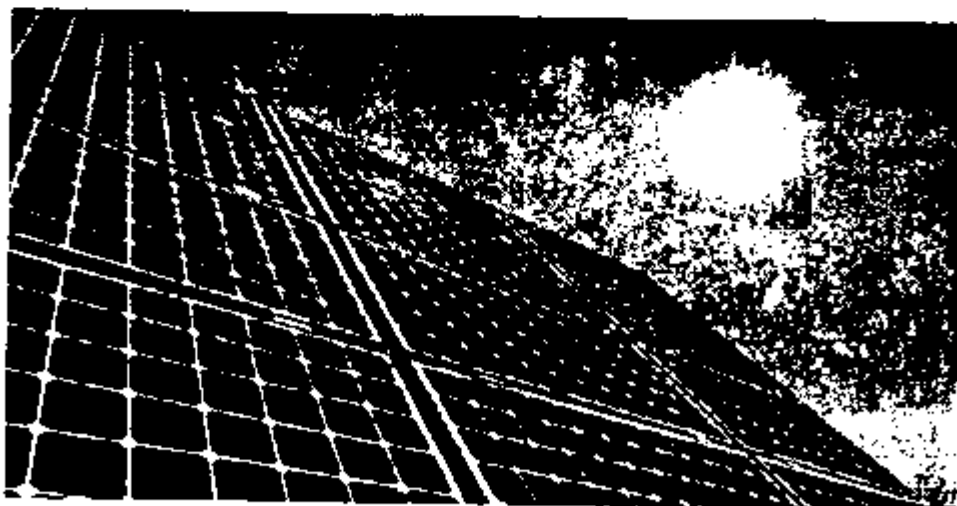
Storage Device: There is a storage structure that accommodates the liquid.

Distribution System: A distribution system is required for the use of this water in the cooking, heating of building and washing, bathing purposes.

ii) Solar Cells:

Definition: "The device in which solar radiations are used to emit the electron from a metal surface (mostly silicon wafers) and causing them to flow is called solar cell".

Solar Panel: When many solar cells are wired together, they form a solar panel. These devices provide huge amount of energy.



Solar Panels

Use of Solar Cells/Panels: These cells are used in

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calculators, toys, watches etc. They are used to provide electricity to telephone booths, lighthouses, parks, scientific research centres etc.

iii) Miscellaneous:

Solar energy is also used in solar power plants, solar distillation plants and solar cookers.

Solar Heat As Limitless Source of Energy: Scientists are working on using solar radiations for the production of energy by other methods, which are most efficient and economical. If they succeed we would be able to produce large amounts of energy with out the danger of exhausting the resources.

Energy From Wind:

People have been getting energy from wind from millions of years. Wind can be used as follows:



A windmill

Sailing of Ships: Wind has been used by man to get power for the sailing of their ships in oceans.

Wind Mills: Wind is used for the operation of wind machines used to pump water to higher altitudes and grinding of grains.

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Electricity Production: Many wind machines are grouped together on wind farms that generate power for operating turbines which is connected with generators that produce electricity.

Use of Wind In Developed World: In United States and Europe wind is widely used for the production of electricity. In United States some wind farms can produce up to thirteen hundred megawatts of electricity per day while one hundred megawatts of electricity per day is the routine production of wind farms in Europe.

Energy From The Tides:

There is a continuous rise and fall in sea water level. It happens twice in twenty-four hours.

Uses:

Irrigation: People living in the costal areas drive sea water to their agricultural lands during the high tide and irrigate their fields. When the water tide is low they release the extra water into the sea.

Electricity: This water can be used for the production of electricity. If there is some storage structure, water can be collected in it during high tide. When water is released to the sea during low tide its mechanical energy can be used for the running of turbines connected to the generators that produce electricity.

Geothermal Energy:

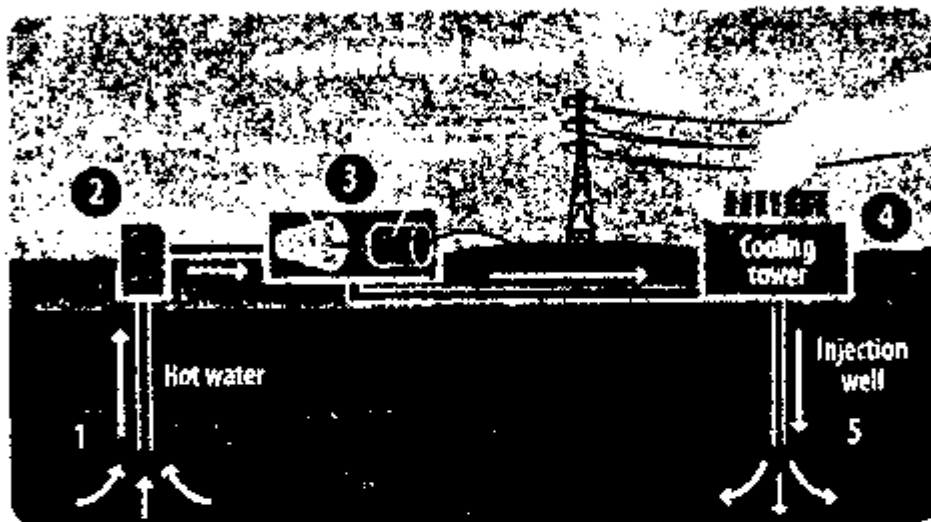
Definition: "The use of heat of magma (hot molten underground part of earth) in any form to get energy is called geothermal energy".

Explanation: The heat of earth causes the water of geysers and springs to become hot. The high temperature of magma also converts nearby water into steam. This heat of earth can be used either directly or for the production of electricity.

Geothermal Wells: If heated water is not available near hot rocks then earth is deeply drilled up to make wells. These wells are called geothermal wells.

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Use of Geothermal Wells: Water is pushed into these wells. Due to extreme heat this water is converted into steam, which rushes to the surface of earth due to expansion. This steam can either be directly supplied for the ultimate use or it can be used for the production of electricity. It is a very cost effective method of energy production. A geothermal well can be effective for about twenty to thirty years.



Geo Thermal Power

Energy From Biomass:

Biomass:

Definition: "The bodies and products of living things like plants and animals constitute biomass".

Explanation: The burning of biomass is used for the production of energy. Out of these wood is widely used and the best-known biomass source of energy production.

Examples of Biomass Used For Energy Production:

Wood, garbage, farm wastes, sugarcane and other plant products are the examples of biomass used for energy production. It has been observed that the burning of bark and other wood wastes fulfill about half of electricity requirements of many industries that use forest products as the raw material.

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Problems:

- The burning of biomass produces same pollutants, which are produced by fossil fuels.
- The trees have to be cut down for burning of wood which is associated to many problems like land erosion.
- The electricity production farms based on burning of wood require much land and supply of wood.

Use of Methane: A mixture of methane and carbon dioxide is obtained by the decomposition of animal dung, dead plants and animals. This methane gas is not only used for the manufacture of fertilizers but also used for the production of electricity. Fifty megawatts of electricity has been produced on experimental basis.

Alternative Fuels:

There are some by-products of living things that can be used as the alternative fuels. Most important of these are alcohols and hydrogen.

Alcohols As Alternative Fuel: Chemically these are methanol and ethanol. They are derived from wood and other plant products. They are used in two ways as fuel.

- a) Firstly they are used as the fuel for the production of electricity.
- b) Secondly they are used as alternative fuel for gasoline and diesel in cars, trucks and other vehicles. In Brazil crops for the production of alcohol are cultivated on thousand of acres. They also use wood from their rain forests for energy production. A mixture of ethanol and gasoline is used as fuel of cars and trucks in United States.

Hydrogen As Alternative Fuel: Hydrogen can be burnt as fuel. It can be obtained from water by electrolysis. The availability of hydrogen is not a problem. 99% of universe mass is made up of hydrogen and it is the most abundant element present in the universe.

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6. Define different units of energy? Give examples of amount of energy in different foods and establish a relationship between Kilowatt per Hour and Kilo Joule.

Ans: Calorie:

Definition: "The amount of heat required to raise the temperature of one gram of water through 1C° is called one calorie".

Joule:

Definition: "If a force of one Newton acts on a body and derives it through a distance of one meter, the work done is called one Joule".

Calorie and joule can be interconnected as follows:

$$1 \text{ Calorie} = 4.2 \text{ Joule}$$

Examples:

- a) One glass of milk provides 150 kcal or 630 kJ of energy.
- b) Egg provides 160 kcal or 670 kJ of energy.
- c) A fresh apple of 200g can provide 170 kcal or 710 kJ of energy.

Relationship between kilowatts per hour and joule:

As $1 \text{ Watt} = 1 \text{ (J/s)}$

Multiplying both sides by 3600 seconds,

$$1 \text{ Watt} \times 3600 \text{ s} = 1 \text{ (J/s)} \times 3600 \text{ s}$$

$$1 \text{ Watt hour} = 3600 \text{ J (as } 3600 \text{ s} = 1 \text{ hour)}$$

Multiplying both sides by 1000,

$$1000 \times 1 \text{ Watt hour} = 3600 \text{ J} \times 1000$$

$$1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$$

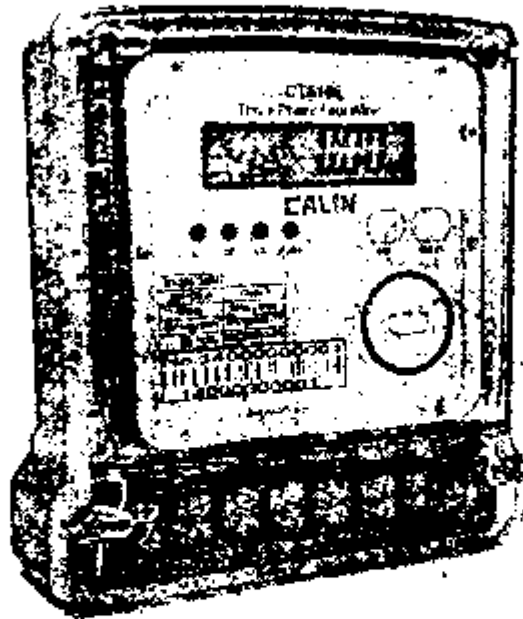
Or $1 \text{ kWh} = 3600 \text{ kJ (as } 1000 \text{ J} = 1 \text{ kJ)}$

7. How energy is measured? What is electricity meter and how it works?

Ans: The measurement of amount of energy produced or used is a better way of estimation instead of measuring the quantity of fuels like wood, coal, natural gas, petroleum, sun, wind, or heat of magma etc.

Measuring Device of Electricity:

Electricity is measured using a device called electricity meter.



Electricity Meter

Working of Electricity Meter: An electricity meter start working as soon as we start consuming electricity. When we turn on an electricity appliance like fan, lamp, and computer etc. an electric current is produced that flows through the appliance and the electricity meter. This current caused a disc of electricity meter to revolve. Consumption of electricity by one unit in kWh is shown on the display window after a fixed number of revolutions of the disc.

Unit of Electricity:

Electricity is measured in kilowatt per hour.

Definition: "The energy consumed, is one kWh when an

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appliance of power of one kilowatt works for one hour”.

Examples:

- The energy consumed is 1 kWh when a bulb of 100 watts works for 10 hours. i.e.

$$100 \text{ (Watt of bulb)} \times 10 \text{ (hour)} = 1000 \text{ Watt hour}$$

$$\text{Or } 100 \text{ (Watt of bulb)} \times 10 \text{ (hour)} = 1 \text{ kWh}$$

- Similarly 10 bulbs of 100 Watts will consume one kWh of energy in one hour.

8. Define pollution. How different sources of energy cause pollution? What are our duties to reduce pollution?

Ans:

Pollution:

Definition: “Any change in the quality of environment causing adverse or unpleasant effects on living things, is termed as pollution”.

Types of Pollution:

Main types of pollution are air pollution, water pollution, land/soil pollution, nuclear pollution, thermal pollution and noise pollution.

Pollution From Energy Sources:

The energy sources like fossil fuels, nuclear elements, wood, and biomass etc. cause the environment to be polluted.

Air Pollution: Air pollution is caused by both natural phenomena and human activities. The air pollution caused by natural sources such as volcanic eruptions, dust storms or forest burning but their effect does not reach upto the harmful level. The air pollution caused by human activities like fuel burning, solid wastes of homes, release of harmful wastes from power plants, toxic gas release from the cars, buses and other vehicles reach to the harmful levels.

Production of Wasted Heat:

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Heat is a by-product of all the power plants. This heat goes in the rivers, lakes, ocean etc. and disturbs the balance of life there. Nuclear power plants produce most of the heat during the process of fission.

Production of Carbon Dioxide:

It is the most abundantly produced pollutant. It is produced during the combustion of fossil fuels and wood. The decomposition of biomass also produces this gas.

Production of Radioactive Wastes:

The nuclear power plants do not produce carbon dioxide but release the isotopic/radioactive elements as waste products. These materials emit very dangerous radiations and there is no proper method of disposing off these materials.

Reduction in Air Pollution:

Following steps are being taken in different countries to reduce the air pollution:

- a) There are some laws in some countries which are to limit the amount of pollutants given off from factories, mills, power plants, automobiles etc.
- b) Catalytic converters are being installed in the new automobiles that convert some of the pollutant gases into non-pollutants ones.
- c) Lead free petrol is being used that has decreased the amount of lead in the environment.

Steps Taken by Individuals to Reduce Pollution:

We can reduce the pollution individually in a number of ways like:

Laws: The use of vehicles run by the burning of fuels should be minimized.

Less Automobiles: To reduce the number of automobiles we should use the public transport.

Use of Bicycles: Every individual especially young people should try to use bicycles for the shorter distances.

Reduce Indoor Pollution: Indoor pollutants like cleaning chemicals, household garbage, building materials, raw materials, tobacco smoke etc. should be minimized and fresh air should be managed to come inside.

9. Define energy conservation. What are its principles and how they can be achieved in different areas of our civilization?

Ans:

Energy Conservation:

Definition: "The most efficient and economical use of energy in such a way that there is least wastage is called energy conservation".

Need To Conserve Energy: The non-renewable resources that the nature has provided us are decreasing day by day due to their indiscriminate use and increase in population. So we are left with two options i.e. either to use renewable sources of energy or to reduce the use of non-renewable sources so that they would be available for our future generations. So the best option that we have is to use all the resources in the best economical way.

Principles of Energy Conservation:

There three principles of energy conservation:

- Education about the importance of energy.
- Knowledge and actions to avoid the indiscriminate use of energy.
- Maximum utilization of renewable sources like solar energy.

Energy can be conserved at different levels of life following the principles of energy conservation.

Energy Conservation in Homes:

Energy is needed for the operation of different home appliances like lamps, fans, heating, television etc. Energy can be conserved at home level by taking different steps and precautions like:

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- a) **Turning Off Unnecessary Appliances:** Those appliances, which are not in use, should be turned off. These include electric irons, computers, televisions, electric heaters, air conditioners, room coolers, lamps, tube lights and others.
- b) **Low Cost Appliances:** Electricity should be used to operate those appliances, which consume electricity in the economical way. These include energy saver bulbs and tube lights.
- c) **White Wash:** The rooms should be white washed so that the light should be used to its maximum.
- d) **Cross Ventilation:** The windows and doors of rooms should be made in such a way that fresh should have a clear passage inside.
- e) **Home Design:** The design of houses should be made in such a way that the solar energy should be utilized to its maximum especially in the cooler areas.
- f) **Closing of Gas Taps:** The gas taps should be closed after their use in kitchen.
- g) **Turn off Unnecessary Lights:** All the unnecessary lights should be turned off if they are not being used during normal operations.
- h) **No Gas Heaters At Nights:** The gas heaters should be turned off before going to sleep. The burning of gas heater at night is not only the wastage of energy but also is much dangerous for the people sleeping in the room.

Energy Conservation in Schools:

The schools use very less amount of energy. It is because they are used during the daytime and energy conservation precautions are usually followed.

Uses of Energy in Schools:

Main use of energy in schools include:

- a) Comfort purposes like air conditioners, fans etc.

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- b) Running of laboratories like those of chemistry, physics, biology and computer.
- c) Operating audio and video media for helping students towards the subject.

The steps that should be taken in schools to conserve energy are:

- a) **Turning Off Unnecessary Appliances:** Those electric appliances, which are not in use, should be turned off immediately.
- b) **Building Design:** The building should be designed in such a way that it should be properly ventilated and one would be able to utilize solar radiations to their full.
- c) **Use of Tube Lights:** Tube lights that consume less electricity should be used instead of bulbs.

Energy Conservation in Industries:

The economy of a country solely depends on industry. It is the symbol of progress, development and prosperity of a country. Energy especially electric energy is the basic need of an industry. So by taking some precautions we can save much amount of energy from industry. Some of these are:

- a) **Turning Off Machines:** The machines should immediately be turned off when they have been used.
- b) **Maintenance:** The machines and other equipments should be properly maintained and greased so that they work efficiently and use minimum of energy.
- c) **Technology Improvement:** The modern machines with higher efficiency and economical energy consumption should be developed.
- d) **Maximum Use of Available Resources:** If sources like electricity are available in surplus amount, it should be used to its full.
- e) **Alternative Sources:** Solar energy, alcohol, hydrogen, sugarcane wastes and wood are the alternative sources of energy, which can be used instead of electricity or natural gas.

- f) **Skilled Labour:** The labour employed at the industry should be so much skilled that the energy should not be wasted by their mistake.

Energy Conservation in Transportation:

A huge amount of energy is being used in the transportation of people and goods from one place to another. All the transportation vehicles including buses, ships, cars, trains, motorcycles, tractors, motorboats etc. are run by consuming fuel, which is a big source of pollution. This area has caused serious threat to the environment and life on earth. Taking following steps we can control this pollution:

- a) **Light Duty Vehicles:** Those vehicles should be used that consume less fuel in economical way.
- b) **Sharing Transportation:** If there is a possibility to share the journey with any other person then there is no need to use our own vehicle.
- c) **Public Transport:** If there is availability of public transport then it should be used because in case of public transport many people can be transported from one place to another by the consumption of fuel in only one unit.
- d) **Train Use:** If train facility is available then it should be preferred on all other public transports.
- e) **Turning Off The Engine:** If we stop for longer time for taking tea etc. the engine of our vehicle should be stopped. It will not only reduce the pollutants to be added in environment but also save extra fuel that otherwise would be wasted.
- f) **Maintenance of Vehicles:** We should keep our vehicles properly tuned because it increases efficiency leading to less fuel consumption and ultimately less pollution.
- g) **Inflated Tyres:** We should keep the tyres of vehicle inflated because by doing this engine required less energy to be consumed.
- h) **Moderate Speed:** The vehicles should be driven at

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moderate speed because energy is used in the economical way by this practice.

- i) **Rejecting Bad Quality Fuels:** If the fuels are of bad quality like petrol causing knocking, it should be rejected. Such fuels do not burn efficiently which is the loss of resources.
- j) **Replacement of Old Engines:** If the engine of vehicle has become old it will cause more pollution. In such cases the vehicle or only the engine should be replaced by a new one.

Energy Conservation in Agriculture:

Pakistan is an agricultural country. Share of agriculture in our GDP is about 24%. So the development, progress and prosperity of our nation depend on improvements in this sector. In agriculture energy is needed in various departments like irrigation, mechanized sowing, weeding, pesticide application, harvesting, threshing, transportation of agricultural commodities, their processing, packing, preservation etc. So proper management in this sector can save a considerable amount of energy.

Measures to Reduce Pollution:

- i. **Storage of Rain Water:** We get much rain in monsoon season. The water obtained during these rains should be stored for future use.
- ii. **Crop Selection:** Those crops should be grown that grow well in the local soil and climatic conditions.
- iii. **Crops According to Available Water:** Those crops should be grown for which water is available at every stage of crop development according their need.
- iv. **Maximum Use of Available Water Resources:** If surplus amount of water is available then those crops should be grown that require more water and give more economic return to the farmer.
- v. **Management of Irrigation Channels:** The irrigation channels should be made of concrete so that there

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should be least seepage losses of water.

- vi. **Cooperate Farming:** Cooperate farming should be promoted because on small patches it is difficult and un-economical to do mechanized farming.
- vii. **Least Use of Tractor For Transportation:** If some other methods of transportation are available then tractor should not be used for the transportation of goods for shorter distances between towns etc.
- viii. **Use of Tube Lights or Energy Saving Bulbs:** The use of electric lamps using less energy both for domestic use and for light traps etc. in fields also helps to great extend to conserve energy.
- ix. **Biogas:** Biomass should be used to produce biogas to fulfill the domestic energy requirements.
- x. **Maintenance of Agricultural Machinery:** The agricultural machinery including tractors, threshers etc. should be maintained properly for their efficient working.
- xi. **Maintenance of Tube Wells:** The motor and other equipments of tube wells should also be maintained, greased and oiled regularly for efficient use of electricity.
- xii. **Tree Plantation:** Trees should be planted at the suitable places. They not only provide alternative sources of fuel but also add oxygen to the environment.
- xiii. **Construction of Dams:** Small dams should be constructed to conserved water and development of fisheries and duck farming there. If these dams are constructed on large scale then they can also be used for electricity production.
- xiv. **Ploughing Management:** The soil should be ploughed according to its need. More ploughing not only wastes energy but also exposes the soil to environment for erosion.

Solved Exercises of Text Book

1. Complete the following statements:

- The energy of a body due to its _____ is called kinetic energy.
- _____ is the major source of energy.
- _____ is one of the pollution free energy.
- In nuclear power plants _____ is used to get energy.
- Polluted air contains _____ that causes headache and even death if taken in large quantities.

Answers:

i)	ii)	iii)	iv)	v)
motion	sun	electricity	uranium	sulphur dioxide

2. Tick (✓) the following statements either True or False:

i)	Fossil fuels are known as non-renewable resources.	True
ii)	A compressed spring possesses kinetic energy.	False
iii)	The energy coming from the sun as heat and light is expected to exhaust within the next 1000 years.	False
iv)	Most of the energy is obtained from natural gas (Sui gas).	False
v)	The unit of electric energy is kWh.	True

3. Encircle one choice a, b, c or d in each case:

- i) Which is the main source of energy on earth?
- a) hydroelectric power b) sun
c) fossil fuels d) nuclear energy

Ans: sun

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ii) Which one is the odd thing?

- a) heat
- b) light
- c) light
- d) sound

Ans: sound

iii) Which types of power provides pollution free from of energy?

- a) thermal power plants
- b) hydroelectric power plants
- c) nuclear power plants
- d) none of these

Ans: hydroelectric power plants.

iv) Which one is not the renewable energy source?

- a) solar energy
- b) oil and gas
- c) nuclear energy
- d) wind energy

Ans: oil and gas

v) Which one is not the unit of energy?

- a) calorie
- b) joule
- c) watt
- d) kilowatt hour

Ans: watt

4. What is the relation between work and energy?

Ans: Energy is actually the ability of an object or person to do some work. So the both are closely related to each other. If some object possesses some capability to do work like to move through some distance or to affect other object by striking it or to produce heat etc., then we say that the object possesses energy. The ability of the object might be due to its motion, position, explosive substance, electric charges etc.

5. What is the difference between kinetic energy and potential energy?

Ans: The kinetic energy of a body is due to its motion while potential energy is possessed by the body due to its position. In other words we can say that the kinetic energy can do work in the immediate time while potential energy is the stored form of energy.

Example: For an instance if a stone is placed at the roof of a high building it possess potential energy. When this stone is dropped from the roof it moves down wards with

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high speed and possess kinetic energy because by striking the earth it can do some work.

6. Describe three advantages of electric energy over other forms of energy?

Ans: It is the pollution free source of energy.

It can be produced in mass by different sources.

It can be used in many ways easily while other sources are used in a limited number of fields.

7. Comment "Sun is the ultimate source of energy on earth".

Ans: It is rightly said that the sun is the ultimate source of energy. This is said because of the fact that the solar energy trapped by plants is converted into chemical energy in the form of food. This food produced by plants is fed by all the animals directly or indirectly. During the decomposition of these animals and plants the microbes also feed on them after their death. So the solar energy is one which is responsible for the provision of food to the life on earth and thus ensuring their survival on earth.

8. Describe ten devices run by electricity.

Ans: The electric devices include television, radio, computer, fans, iron, electric heaters, air conditioners, room coolers, electric lamps, pH meters, electric balances, electric motors etc.

9. Describe some of the renewable source of energy.

Ans: Renewable Sources of Energy:

Definition: "These include all those sources of energy that are not limited in their use and do not exhaust like fossil fuels".

There are many sources of energy, which can be used without the threat of their running out. These include:

Energy of Water:

Energy is obtained from water in the hydro power plants. It is the pollution free source of energy production. For

this purpose dams are constructed all over the world.

Dams: Dams are the structures used to store water. These are made at those locations where it is possible to make water flowing down the hill. This energy is then used to run the turbines that convert mechanical energy of water into electrical energy. These dams are also used for irrigation purposes.

Energy from Sun:

All the life on earth depends on solar energy for fuels and food. Energy is obtained from sun directly or indirectly.

Properties of Solar Energy: Firstly this energy is not harmful to environment in any case. Secondly solar energy is thousand of times more than the requirement by us.

Methods of Using Solar Energy:

Solar energy can be used for the production of electricity and heating of water in the winter season in colder areas.

Energy From Wind:

People have been getting energy from wind from millions of years. Wind can be used as follows:

Sailing of Ships: Wind has been used by man to get power for the sailing of their ships in oceans.

Wind Mills: Wind is used for the operation of wind machines used to pump water to higher altitudes and grinding of grains.

Electricity Production: Many wind machines are grouped together on wind farms that generate power for operating turbines which is connected with generators that produce electricity.

Use of Wind In Developed World: In United States and Europe wind is widely used for the production of electricity. In United States some wind farms can produce up to thirteen hundred megawatts of electricity per day while one hundred megawatts of electricity per

day is the routine production of wind farms in Europe.

Energy From The Tides:

There is a continuous rise and fall in sea water level. It happens twice in twenty-four hours.

Uses:

Irrigation: People living in the costal areas drive sea water to their agricultural lands during the high tide and irrigate their fields. When the water tide is low they release the extra water into the sea.

Electricity: This water can be used for the production of electricity. If there is some storage structure, water can be collected in it during high tide. When water is released to the sea during low tide its mechanical energy can be used for the running of turbines connected to the generators that produce electricity.

Geothermal Energy:

The heat of earth causes the water of geysers and springs to become hot. The high temperature of magma also converts nearby water into steam. This heat of earth can be used either directly or for the production of electricity.

Energy From Biomass:

The burning of biomass is used for the production of energy. Out of these wood is widely used and the best-known biomass source of energy production.

Alternative Fuels:

There are some by-products of living things that can be used as the alternative fuels. Most important of these are alcohols and hydrogen.

10. Explain the working of a solar house heating system.

Ans: A solar house heating system is designed to use the sun radiations for the heating purposes in cold areas. The

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sun rays are collected by the collector by the absorption of sun radiations through blank plastic plates. Some water pipes are allowed to pass through the collector. This causes the water in the pipe to heat up which can be used for the house hold purposes by its distribution to different parts of the house using a well designed distribution system.

- 11. Describe how geothermal energy can be used to generate electricity.**

Ans: When water is pumped into the geothermal wells it is converted into super heated steam due to the heat of the well. This steam then expands quickly and can be subjected to the turbines for the production of electricity.

- 12. How energy obtained from fossil fuels affects the environment?**

Ans: The energy obtained from fossil fuels causes many environmental problems. This is because the burning of the fossil fuels produces toxic gases like sulfur dioxide, oxides of nitrogen and oxides of lead etc. In addition to these carbon dioxide is added by the burning of fossil fuels in large amounts. This carbon dioxide is main source of global warming.

- 13. Name some of the pollutants produced by burning of fuel.**

Ans: The burning of different fuels add different type of pollutants. These pollutants added by fuels are carbon dioxide, carbon monoxide, sulphur dioxide, nitrogen peroxide, nitric oxide, lead oxide etc.

- 14. Define the unit of calorie.**

Ans: The amount of heat energy required by one gram of water for raising temperature through one degree centigrade is called calorie.

- 15. Give ways to control pollution.**

Ans: Following steps can be taken to control pollution:

- There are some laws in some countries which are to limit the amount of pollutants given off from factories, mills, power plants, automobiles etc.

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- Catalytic converters are being installed in the new automobiles that convert some of the pollutant gases into non-pollutants ones.
- Lead free petrol is being used that has decreased the amount of lead in the environment.
- The use of vehicles run by the burning of fuels should be minimized.
- To reduce the number of automobiles we should use the public transport.
- Every individual especially young people should try to use bicycles for the shorter distances.
- Indoor pollutants like cleaning chemicals, household garbage, building materials, raw materials, tobacco smoke etc. should be minimized and fresh air should be managed to come inside.

16. Write a short note on energy conservation in transport.

Ans.

Energy Conservation In Transportation:

A huge amount of energy is being used in the transportation of people and goods from one place to another. All the transportation vehicles including buses, ships, cars, trains, motorcycles, tractors, motorboats etc. are run by consuming fuel, which is a big source of pollution. This area has caused serious threat to the environment and life on earth. Taking following steps we can control this pollution:

- a) **Light Duty Vehicles:** Those vehicles should be used that consume less fuel in economical way.
- b) **Sharing Transportation:** If there is a possibility to share the journey with any other person then there is no need to use our own vehicle.
- c) **Public Transport:** If there is availability of public transport then it should be used because in case of public transport many people can be transported from one place to another by the consumption of fuel in only

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one unit.

- d) **Train Use:** If train facility is available then it should be preferred on all other public transports.
- e) **Turning Off The Engine:** If we stop for longer time for taking tea etc. the engine of our vehicle should be stopped. It will not only reduce the pollutants to be added in environment but also save extra fuel that otherwise would be wasted.
- f) **Maintenance of Vehicles:** We should keep our vehicles properly tuned because it increases efficiency leading to less fuel consumption and ultimately less pollution.
- g) **Inflated Tyres:** We should keep the tyres of vehicle inflated because by doing this engine required less energy to be consumed.
- h) **Moderate Speed:** The vehicles should be driven at moderate speed because energy is used in the economical way by this practice.
- i) **Rejecting Bad Quality Fuels:** If the fuels are of bad quality like petrol causing knocking, it should be rejected. Such fuels do not burn efficiently which is the loss of resources.
- j) **Replacement of Old Engines:** If the engine of vehicle has become old it will cause more pollution. In such cases the vehicle or only the engine should be replaced by a new one.

Section-III

Short Questions with Answers

1. **What is energy?**

Ans: The ability of any thing to do some work is called energy. There are different forms of energy depending on its ability, nature and effects produced.

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2. What are different forms of energy?

Ans: Energy has many forms like mechanical energy, heat energy, sound energy, chemical energy, nuclear energy, light energy, electrical energy etc.

3. What type of energy is present in the water drops of rain?

Ans: The raindrops when move from clouds to the ground they possess the kinetic energy due to their motion. Due to this energy these drops can affect the soil particles to erode.

4. What is the difference between potential energy and kinetic energy?

Ans: The potential energy of an object is due to its position while kinetic energy is due to its motion.

5. What is mechanical energy?

Ans: The energy, which is possessed by an object due to its motion or position, is called mechanical energy. The examples of objects possessing mechanical energy are water running down hill, a fast moving car, strongly moving wind, a compressed or stretched spring, lifted hammer and plough driven by a tractor or bull.

6. Give some examples of the objects possessing potential energy.

Ans: The objects having potential energy are water stored at some height, raised hammer, stretched or compressed spring, a stone placed at upper altitude and a raindrop present in the clouds etc.

7. What are the sources of light?

Ans: Main source of light is sun. Other sources are the burning of fuels like oils, woods and the inflorescent materials used in tube-lights, electric bulbs and candles etc.

8. What is energy cycle?

Ans: An energy cycle means that the energy is being converted from one form to the other but the total energy remains the same.

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9. What is the general principle of energy or law of conservation of energy?

Ans: The law of conservation of energy states that energy can neither be created nor destroyed but it can be converted from one form to the other.

10. Give the mechanism of heating of our hands on rubbing with each other.

Ans: When we rub our hands quickly, they become warm. This is because chemical energy causes our muscles to move to produce kinetic energy, which then produces heat energy by the force of friction between the surfaces of our hands.

11. What are the problems related to the use of fossil fuels?

Ans: The present form of fossil fuels has taken millions of years to develop so once they are exhausted there will be energy crisis. Carbon dioxide, carbon mono-oxide etc. are the waste products of petroleum that pollute the environment and are hazardous for our health.

12. What is meant by solar house heating?

Ans: It is a method in which solar energy is used in the cooler areas for obtaining hot water. For this purpose complete solar house heating system has to be maintained.

13. What is nuclear fission?

Ans: In this process heavy nuclei are bombarded with neutrons. As a result these nuclei split up into smaller parts and give out energy and more neutrons that further affect other atoms and so on. This process is associated with the release of huge amount of energy.

14. What are renewable sources of energy?

Ans: These include all those sources of energy that are not limited in their use and do not exhaust like fossil fuels like rain water, solar energy and wind etc.

15. Define solar cell.

Ans: The device in which solar radiations are used to emit the electron from a metal surface (mostly silicon wafers) and

causing them to flow is called solar cell.

16. What is geothermal energy?

Ans: The use of heat of magma (hot molten underground part of earth) in any form to get energy is called geothermal energy. This heat of earth can be used either directly or for the production of electricity.

17. How methane can be used in the electricity production?

Ans: A mixture of methane and carbon dioxide is obtained by the decomposition of animal dung, dead plants and animals. This methane gas is used for the production of electricity. Fifty megawatts of electricity has been produced on experimental basis.

18. For what purposes alcohol can be used as fuel?

Ans: Firstly alcohol is used as the fuel for the production of electricity. Secondly they are used as alternative fuel for gasoline and diesel in cars, trucks and other vehicles.

19. Give three principles of energy conservation.

Ans: Three principles of energy conservation are:

- a) Education about the importance of energy.
- b) Knowledge and actions to avoid the indiscriminate use of energy.
- c) Maximum utilization of renewable sources like solar energy.

20. Why dams should be constructed?

Ans: Small dams should be constructed to conserve water and development of fisheries and duck farming there. If these dams are constructed on large scale then they can also be used for electricity production.

21. Why rain water should be stored?

Ans: Rainwater is stored for two purposes i.e. firstly to conserve water for the ultimate utilization for irrigation, electricity production and development of fish and duck farming and secondly to conserve the soil from erosion due to run-off of rainwater.

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22. What is the requirement of energy in agriculture sector?

Ans: In agriculture energy is needed in various departments like irrigation, mechanized sowing, weeding, pesticide application, harvesting, threshing, transportation of agricultural commodities, their processing, packing, preservation etc. So proper management in this sector can save a considerable amount of energy.

23. How individuals can control pollution?

Ans: The pollution can be controlled by the individuals by using light duty vehicles, sharing vehicles for transport, using public transport, using train for long transportation, maintaining the vehicles, using good quality fuels, use of inflated tyres, replacing the old engines etc.

24. How nuclear power plants pollute the environment?

Ans: The nuclear power plants do not produce carbon dioxide but release the isotopic/radioactive elements as waste products. These materials emit very dangerous radiations which adversely effect the humans and animals.

25. What type of biomass is used for energy production?

Ans: Wood, garbage, farm wastes, sugarcane and other plant constitute the biomass used for the energy production. Out of these wood is widely used and the best-known biomass source of energy production.

26. How government can play its role to prevent people from pollution?

Ans: There are some laws imposed by the governments of some countries, which are to limit the amount of pollutants given off from factories, mills, power plants, automobiles etc.

27. What is the main pollutant produced by the all the power plants?

Ans: Heat is a by-product of all the power plants. This heat goes in the rivers, lakes, ocean etc. and disturbs the balance of life there. Nuclear power plants produce most

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of the heat during the process of fission.

28. Give different types of pollution.

Ans: Main types of pollution are air pollution, water pollution, land/soil pollution, nuclear pollution, thermal pollution and noise pollution.

29. How electricity meter works?

Ans: When we turn on an electricity appliance like fan, lamp, and computer etc. an electric current is produced that flows through the appliance and the electricity meter. This current caused a disc of electricity of meter to revolve. Consumption of electricity by one unit of electricity in kWh is shown on the display window after a fixed number of revolutions of the disc.

30. Define Joule.

Ans: If a force of one Newton acts on a body and derives it through a distance of one meter, the work done is called one Joule.

31. Why hydrogen is said to be used as an alternative source of energy in future?

Ans: This is because the combustibility of hydrogen is very good and most importantly the availability of hydrogen is not a problem. 99% of universe mass is made up of hydrogen and it is the most abundant element present in the universe.

32. Define calorie.

Ans: The amount of heat required to raise the temperature of one gram of water through 1°C is called one calorie.

Objective Questions

Index and Answers

a) decreases
b) sometimes increases and sometimes decreases
c) remains same
d) increases

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- Answers:**

1. b	8. c	15. d	22. c
2. a	9. d	16. b	23. b
3. a	10. b	17. d	24. a
4. b	11. d	18. d	25. b
5. d	12. d	19. a	
6. d	13. c	20. b	
7. d	14. b	21. b	

Section-V

TEST YOUR MEMORY

Fill in the blanks and True or False questions are not included in the examination paper. However the same are being given for Memory Test of students.

a. Fill in the blanks:

1. When we say that a body has energy, we mean that it has _____ to do to work.
2. The energy possessed by a body both due to its motion and position is called _____ energy.
3. The energy that a body possess due to its motion is called _____ energy.
4. The energy that a body possess due to its position is called _____ energy.
5. The sun is the main _____ of heat energy.
6. Plants produce _____ in the presence of sunlight.
7. _____ energy is the energy released in the form of nuclear radiations.
8. Heat energy released in nuclear reactors is changed into _____ energy.
9. Energy can be converted from _____ to _____ form.
10. Thermal energy causes water to _____ from the surface to form water vapours.
11. If rain water flows down its kinetic energy changes into _____ energy.
12. Turbines move generators which produce _____ energy.
13. Life on earth needs energy for its _____.
14. The progress and prosperity of a country depends upon the _____ of its energy resources.
15. The process taking place in nuclear reactors is known as _____.
16. Sunlight and water are _____ sources of energy.
17. _____ energy is kinetic energy.

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18. Solar energy can be converted into electricity by _____.
19. When sunlight falls on a solar cell, it converts the light directly into _____ energy.
20. There is hot molten part deep in the earth called _____.
21. Once collected methane can be burnt to produce _____.
22. In experimental plants _____ megawatts of electricity per day have been obtained.
23. Hydrogen gas makes up to _____ % of the mass of the universe.
24. Every molecule of water contains _____ atoms of hydrogen.
25. The hydrogen can be burnt as _____.
26. A conventional unit to measure energy is _____.
27. One glass of milk contains nearly _____ kcal or _____ kJ of energy.
28. An egg provides nearly _____ kcal or _____ kJ of energy.
29. 200g apple provides _____ kcal or _____ kJ of energy.
30. The energy unit for measuring electricity is _____.
31. A temperature rise in the environment that disturbs life is called _____ pollution.
32. It has become very important to take necessary measures to conserve energy in _____.
33. Thermal pollution upsets the balance of life and _____ the life.
34. One joule is the amount of work done by force of _____ Newton.
35. If water is stored in a basin at high tide then its energy can be used to derive _____.
36. Dams help to control _____ by storing water.
37. Solar energy reaching earth is _____ times more than energy consumption by mankind.
38. Nuclear has _____ waste.
39. We cannot _____ or destroy energy.
40. The burning of wood, coal or natural gas in air is a _____ reaction.
41. Solar energy is the energy of _____.

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Answers:

1.	ability	22.	fifty
2.	mechanical	23.	99
3.	kinetic	24.	two
4.	potential	25.	fuel
5.	source	26.	calorie
6.	food	27.	150, 630
7.	nuclear	28.	160, 670
8.	electric	29.	170, 710
9.	one, another	30.	kilowatt-hour
10.	evaporate	31.	thermal
11.	thermal	32.	transportation
12.	electrical	33.	endanger
13.	survival	34.	1
14.	exploitation	35.	turbines
15.	nuclear fission	36.	floods
16.	renewable	37.	thousand
17.	solar	38.	dangerous
18.	solar cells	39.	create
19.	electrical	40.	chemical
20.	magma	41.	sunlight
21.	electricity		

b) Indicate the True/False Statements:

1. Falling water has potential energy in it.
2. A car moving with high speed possess kinetic energy.
3. A rain drop coming from the clouds possesses mechanical energy.
4. Light energy is converted into chemical energy by green plants.
5. Plants are the secondary producers.
6. Water is a non-renewable resource of energy.
7. Mechanical energy has three types.
8. Rubbing hands without the requirement of other form of energy to be consumed can produce heat energy.
9. Electricity production through water adds many pollutants to the environment.

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10. Electricity is a big source of pollution.
11. Nuclear energy can be produced without any pollution to atmosphere.
12. The dams are only constructed for supporting the agricultural lands with irrigation water.
13. Wind energy can be used for the production of electricity.
14. Water energy is used for the production of energy.
15. Solar house heating system is used for the production of electricity for domestic consumption.
16. Solar cells convert solar energy into heat energy.
17. The hot water coming from deep of earth in the form of streams is called magma.
18. Biomass includes the living organisms.
19. Methane and carbon dioxide are produced by the decomposition of animal and plants dead remains.
20. Calorie is the unit of electricity.
21. One unit in electricity terms is equal to one kilowatt per minute.
22. Energy conservation means the use of available energy resources to their maximum.

Answers:

1. False	9. False	17. False
2. True	10. False	18. False
3. True	11. False	19. True
4. True	12. False	20. False
5. False	13. True	21. False
6. False	14. True	22. False
7. False	15. False	
8. False	16. False	

c. Identify and label the following figures:

Figure 1

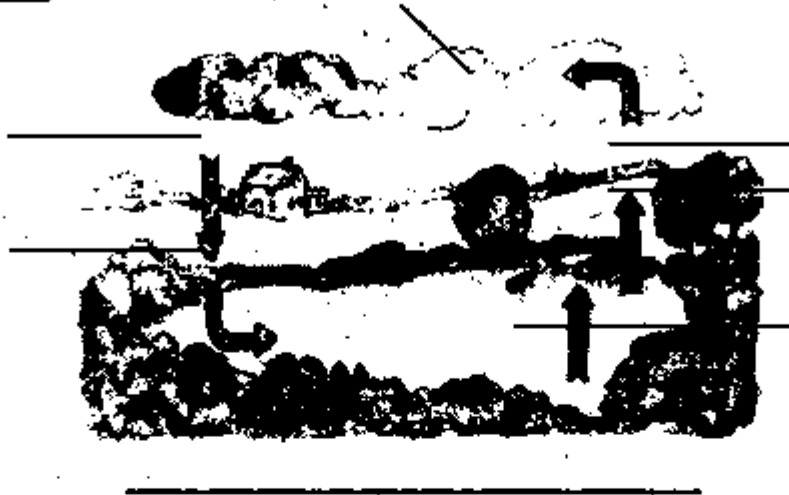
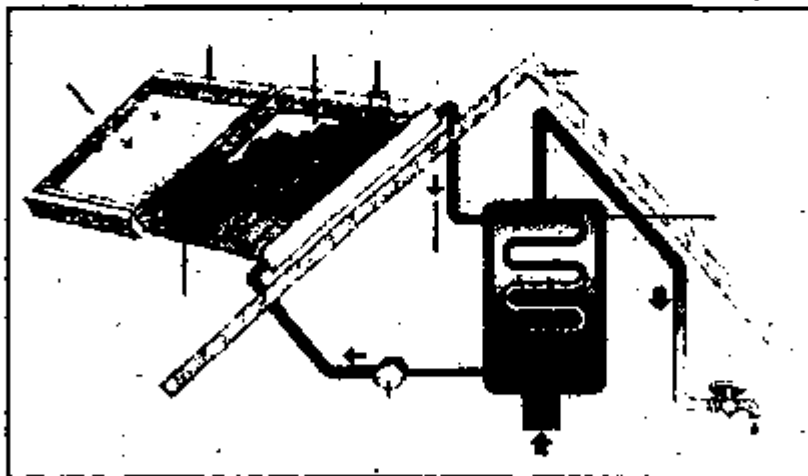


Figure 2



9

Basic Electronics

Section-I

Introduction to Chapter

Contents: This chapter deals with the following topics.

- Semiconductors.
- Formation of Semiconductor Diodes.
- Radio Waves, Their Nature and Uses.
- Radio Transmission and Reception.
- Components of a Radio Set.
- Television Set.
- Structure of an Ordinary Television.
- Cable Television.
- Use of Optical Fibre.
- Satellite TV.
- Computers, Components and Uses of Computers.
- Microprocessors.
- Information Technology.
- Modern Machines Used in IT.

Section-II

Comprehensive Questions with Answers

1. What are semiconductors? How semi-conducting materials can be used to make P-type and N-type semi-conductors?

Ans:

Semi-conductors:

"The materials which are less conductors of electricity, in between to conductors and insulators, are called semiconductors".

Examples: The most important semiconductors are Silicon and Germanium. They conduct electricity in the crystalline state and their conductivity decreases with the increase in temperature by providing more resistance to the current flow.

Use of Semiconductors: Adding some impurities to the semi conducting materials can form P-type and N-type semiconductors.

N-type Semiconductors: When a pure crystal of Antimony or Arsenic (belonging to group V of periodic table with valence number of -3) is added to a semiconductor, N-type semiconductor is formed with many free electrons in it. So in this case electrons are the charge carriers and their flow causes electricity to flow.

P-type semiconductors: When pure crystal of Germanium or Indium (belonging to group III of periodic table with a valence number of +3) is added to a semiconductor, it is converted into P-type semiconductor. It contains "holes" in it which have vacancy of electrons. So these holes act as positive charge carriers.

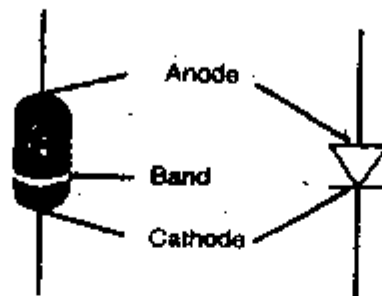
Use: The N-type and P-type semiconductors are used in the many semiconductor devices like diodes, transistors, integrated circuits and amplifiers.

2. What is a semi-conductor diode? Give its structure, working and uses.

Ans:

Semiconductor Diode:

A semiconductor diode is formed by using N-type and P-type semiconductors.



A diode and its symbol

Structure: It is a simple device consisting of a thin slice of pure semiconductor with N-type and P-type semiconductors on both of its sides. The P-type material acts as anode and N-type material acts as a cathode. The wire nearest the band is connected to its cathode and the other at the other end is connected to its anode.

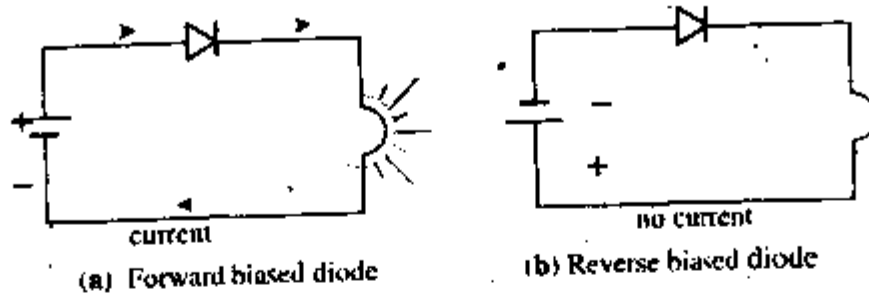
Types and Working: There are two types of diodes whose working is different i.e.

Forward Biased Diode: In this case the positive terminal is connected to the anode and the negative terminal is connected to the cathode. It results in very low resistance and a large current flows through it.

Reverse Biased Diode: In this case the positive terminal is connected to the cathode and the negative terminal is connected to the anode. This results in high resistance and no current flows through the circuit.

Example: When a diode conducts bulb in the circuit glows. If the diode is forward it can be overheated and damaged so bulb acts as a resistor and limits the flow of current.

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Action of a diode (a) Bulb glows (b) Bulb does not glow

Uses of Diodes: The diodes allow current in only one direction so they are used in a number of ways like.

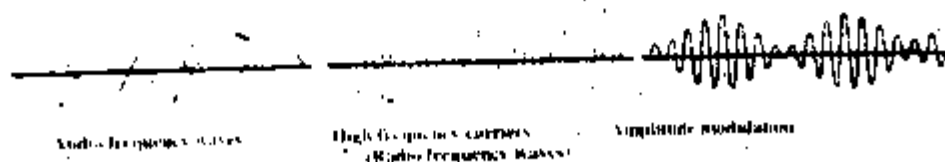
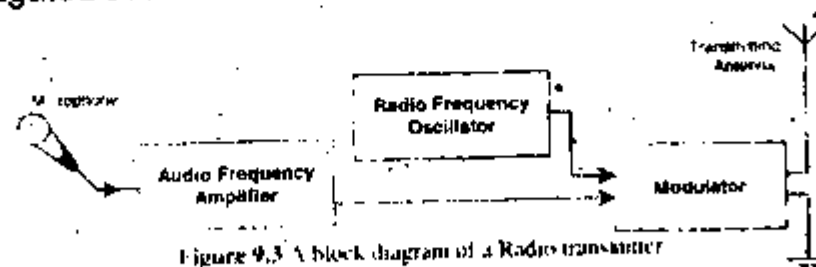
- They are used to make rectifiers that convert AC to DC.
- They are used in the process of demodulation i.e. detecting the messages from radio waves.

3. **What is meant by radio waves and a radio set? Write a detailed note on the working of radio wave transmission and reception.**

Ans: The radio waves are electromagnetic waves with very long wavelength. These waves travel with the speed of light. They are propagated into the space through transmission antenna and received through receiving antenna.

Radio

A radio is a device that is used to the radio waves which are propagated at the radio station.



Radio Mechanism: The speech or music is converted into radio waves at the radio station and received through radio set at home. These two mechanisms of transmission and reception are explained as follows.

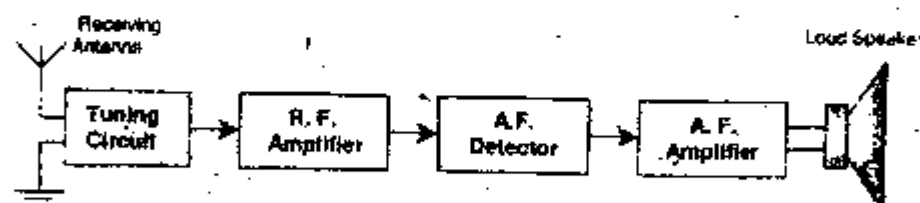
Radio Transmitting Mechanism:

The sound or music waves are converted into electric signals by the microphone. Different sound waves have different frequency and amplitude.

Modulation: The electric signals of radio range are amplified through A.F. amplifier and superimposed over high frequency radio carrier waves of constant amplitude called modulating waves. This process is called modulation. The resulting waves are transmitted through antenna.

Radio Receiving Mechanism:

The radio waves transmitted at radio station are interrupted by the receiving antenna thus producing high frequency electric variations. As a result high frequency R.F. voltage is produced. The R.F. voltage reaches input terminal of radio receiver with the help of a cable. There are many circuits in the radio receiver that carry out the processing of the signals and reproduce the original sound.



Block diagram of a radio receiver

Circuits of Radio Receiver: A radio receiver consists of three circuits i.e. tuning circuit, radio frequency amplifier (R.F. amplifier) and audio frequency detector (A.F. detector).

Radio Tuning: The tuning circuit of the radio receiver rejects all the R.F. signals except those which are adjusted or tuned through tuning knob.

4. What is a television? How it works?

Ans:

Television:

A television is an electronic device that receives the electromagnetic waves of both picture and sound simultaneously.

Structure and Working:

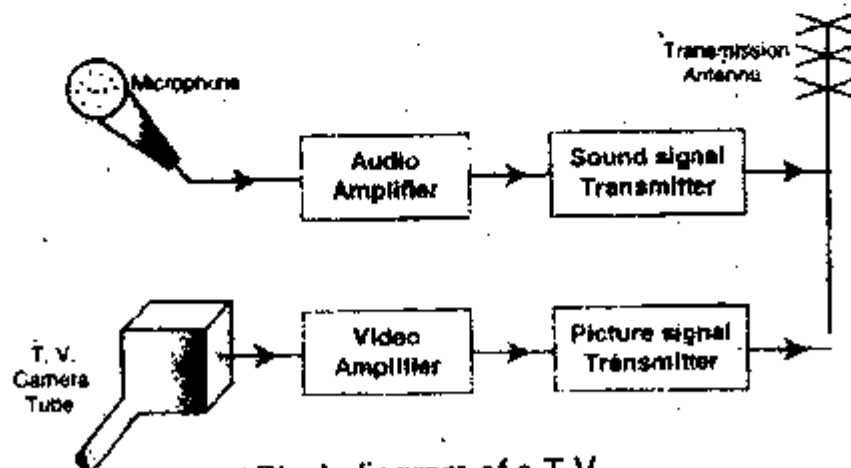
The television mechanism depends upon a camera tube and a picture tube.

Camera Tube: It is a photographic tube that produces electrical signals corresponding to the visual information in a picture. As a comparison with the sound transmission camera tube acts as a microphone at broadcasting station and the picture tube acts as the loud speaker at the receiver.

Picture Tube: It is the receiving tube that converts the signal voltage into a visual image in its screen, and thus displaying the original picture.

Transmission Mechanism:

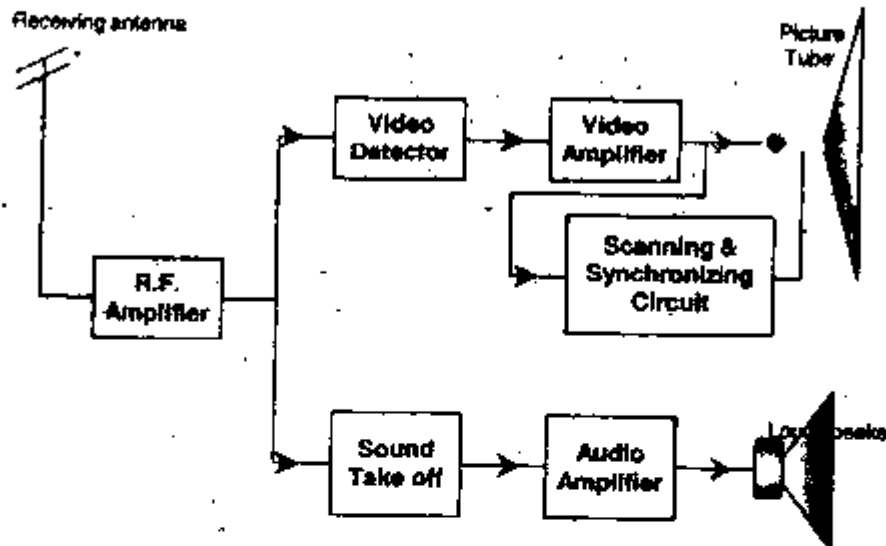
The sound and picture are converted into electric waves with the help of microphone and camera tube respectively. The audio signals (of sound) and video signals (of picture) are modulated and transmitted through an antenna.



Block diagram of a T.V.

Receiving Mechanism:

The antenna from a TV transmitter, interrupts the electromagnetic waves which are transmitted at broadcasting station. The picture is reproduced from these signals by the picture tube after some processing.



Block diagram of a Television Receiver

5. Write a note on the cable television.

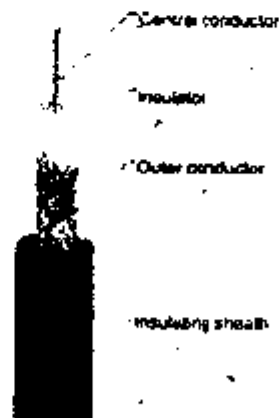
Ans:

Cable Television:

In a cable television the transmission mechanism of the sound and picture messages is different. Instead of putting electric signals of sound and picture produced through a microphone and camera over radio waves, a cable is used for this purpose.

Working Mechanism:

In a cable television electric signals travel through cables from



The structure of a simplest type of coaxial cable

television station or satellite's ground station to subscriber's television receiver. It is possible to carry sound and picture signals from several satellites and television station at a time.

Use of Optical Fibres:

The optical fibres are very efficient in carrying light signals from one place to other. They can carry light signals thousand times greater than those from other cables. So the copper cables are being replaced by these optical fibres for both local and long distance television links.

Working Mechanism of Optical Fibres:

In this case the electrical signals of sound and picture are converted into light signals that travel through optical cable containing a large number of thin glass fibres. These signals are then converted into electric signals by optical receiver and then sent to the television receiver for the picture display.

6. What is the limitation of radio waves and how this defect is overcome using satellite television?

Ans:

Limitation of Radio Waves:

The limitation of the radio waves is that they can travel through very less area due to the curvature of earth's surface. Because of this factor the television transmissions are possible to the limited area of about 60 km radius. This problem is overcome by the use of satellite.

Satellite Television:

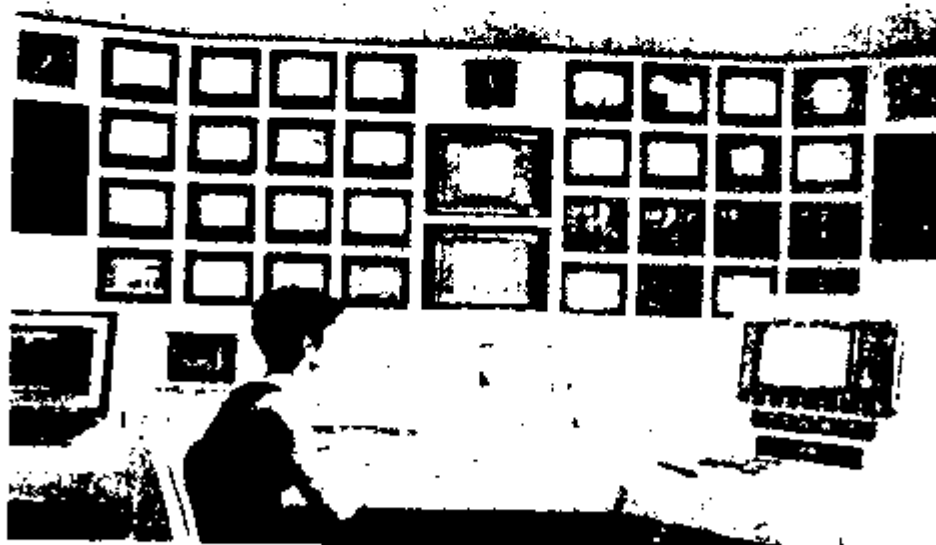
It is the method of transmission of television programs using a satellite that hover around earth. These satellites are fixed in the horizon with respect to a place on earth. The use of satellite has made possible to transmit the television programs worldwide.

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Satellite Relay System

Transmission Mechanism: The radio waves carrying television programs are focused by a dish like antenna to the satellite orbiting around the earth. The waves received at satellite are amplified.



Satellite Control Room

Receiving Mechanism: The radio waves amplified at the satellite are sent back to earth where satellite dishes placed on roofs of the houses on earth receive them. Here they are converted into electric signals and again a television set is

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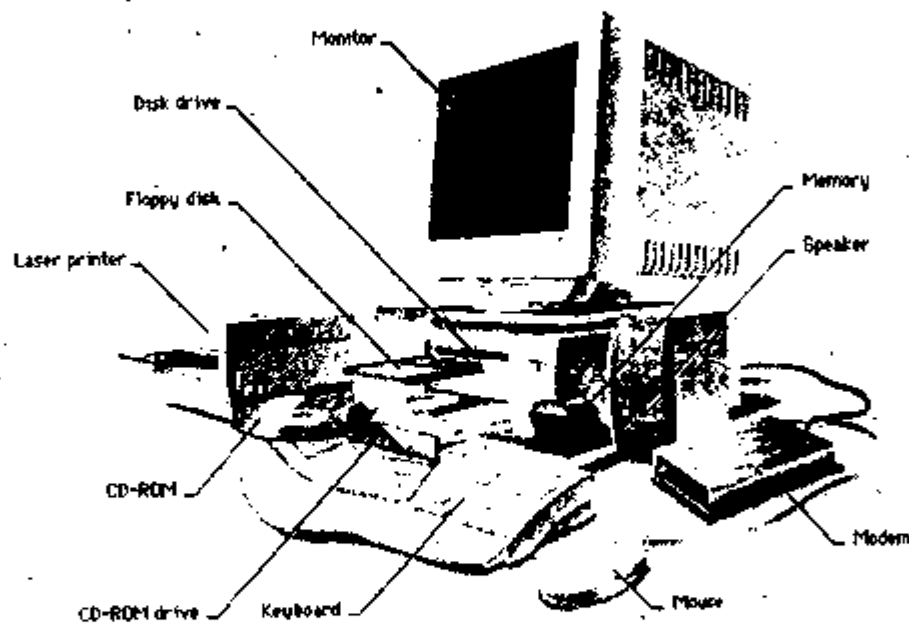
used to reproduce the original picture and sound messages.
Due to this function of satellites they are also called communication satellites.

7. What are computers? Give their basic units and their functions.

Ans:

Computer:

"A highly complicated electronic device processing the entered data and providing results rapidly and accurately is called a computer".



Personal Computer

Basic Units of A Computer:
Basic units of a computer are:

Input Units:

These are the parts of a computer through which we enter the data. This data is converted into electric pulses.

Examples: Keyboard, mouse, light pen, scanners etc.

Central Processing Unit (CPU):

The electronic data is stored first in the memory where it is

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processed. In modern computers one or more microprocessors are used. The central processing unit consists of two sub-units i.e.

Control Unit: This unit controls the overall working of the entire computer system.

Arithmetic and Logic Unit: These units carry out the arithmetic and logic operations of the input data.

Output Unit:

These are the components of computer through which the processed data is displayed and becomes sensible to the computer operator.

Examples: Monitors, printers, loud speakers etc.

Storage or Memory:

There are two types of Storage.

- a) **Primary Storage Memory:** It has further two types.
 - i. **Read Only Memory (ROM):** It is a permanent memory supplied by the manufacturer and contains all the necessary codes and instructions needed for the computer to be operated.
 - ii. **Read And Write Memory (RAM):** It is the temporary memory. The necessary software and data is loaded into this memory at the turning on of computer.
- b) **Secondary Storage Memory:** This memory is used to store data, instructions and processed data by the users. It is used to supplement the capacity of main memory. Its storage capacity is usually very large. Different types of disk drives and magnetic disks are used for this purpose. Most common magnetic disks are floppy disks and hard disks.

Mother Board:

It is a board on which central processing unit is mounted. The motherboard also contains RAM and ROM along with other components.

8. Write a note on the structure, working and uses of microprocessors.

Ans:

Microprocessor:

The efficiency of a computer depends upon the types of microprocessor used in the system. It depends upon the manufacturer that what type of processor he uses in the system. Modern microprocessors have millions of transistors and other circuit elements and can process large amount of data at a time.

Structure of Microprocessor:

A microprocessor is central processing unit which is constructed on a single chip of silicon. This chip contains thousands of circuit elements which are grown layer over layer on the chip.

Components: A microprocessor consists of two components i.e.

- i. Control Unit
- ii. Arithmetic and Logic Unit (ALU):

In old times digital circuits were designed using vacuum tubes but now transistors have replaced these.

Examples:

- The microprocessors are used in the cameras for the adjustment of the shutter speed and lens. These cameras are easy to operate. They have helped the professional photographers for producing quality pictures.
- The microprocessors are also used as a controlling element in many devices like microwave ovens, office machines, mobile phones, game machines, video tape recorders, washing machines, mechanical equipments etc.

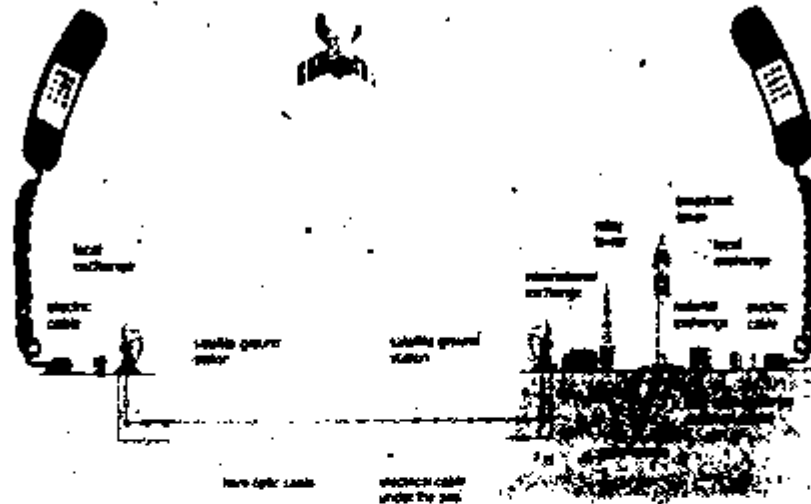
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9. Write a comprehensive note on information technologies.

Ans:

Information Technology:

"The use of science in order to store, handle and transmit information is called information technology".



Telecommunication is an integral part of Information Technology

Explanation: New advancements in the field of electronics have provided us the devices through which we can be connected to each other at any time, anywhere in the world. Today there is no need of sending letters to our dear ones and then waiting for weeks for reply. This age is called as the age of information. By the use of information technology people of the world are coming closer and closer converting world into a global village.

Computer Technology: Most powerful, quick, accurate and flexible technology is the computer technology. A computer can compute with high speed, communicate the data which is present in the form of text, sound and video. The computer is bringing changes in our working, standards of living and level of thinking.

Telecommunication: It refers to the methods used in sending information instantly over long distances.

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Telecommunication Devices: There are many devices used for communication today. These include television, telephone, mobiles, radio, computers etc. They sent the information in the form of computer text files, pictures, sound, video etc.

Telephone:

It is considered to be the one of old method of communication.

Working Mechanism: Our sound is first converted into electrical signals which are then sent to the telephone exchange with help of a wire. From the exchange they are sent to the receiver on the other end where they are again converted into sound. The electrical signals produced due to our speech may also be converted into light signals or radio waves and travel through optical fibers or communication satellite in space respectively.

Mobile Phone: It is also called as a cellular telephone. It has a small built in transmitter and a receiver. Our speech in this case is converted into radio waves which are then sent to nearby station that is connected to the network. These signals are then sent to the receivers mobile where they are converted into the sound again.

Cell: It is the area which is covered by one communication station. If the caller moves from one place to the other his mobile is automatically connected to the cell of that area. In case the station is not present in the nearby locality mobile will not work.

Facsimile (FAX) Machine:

The word facsimile means the exact reproduction of document, picture or print.

Working Mechanism: A fax machine scans a document and then converts the light and dark parts into electric signals. These electric signals travel through the telephone wire to the other fax machine at the receiving end where these are reproduced in the original form.

Telex Machine:

It might be a teleprinter or exchange machine.

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Working Mechanism: It works in the same way as fax machine but the text has to be typed in the telex machine first and then it is converted into the electric signals. These are now sent to the receiving telex machine through telephone lines. Here the text is printed out with the original text.

Computer:

A computer provides us many communication facilities through Internet. Some of these are:

- a. It allows its users to send written messages, graphics, pictures or sound.
- b. The receivers can see the messages whenever they want.
- c. It provides the bulletin board facility by which information can be sent to the network from where any person can use it.
- d. The computer video conferencing provides a chance to the compute users to look at and talk to each other even if they are thousands of miles apart from each other.

Solved Exercises of Text Book

1. Complete the following statements:

- vi. Silicon is an important _____ material.
- vii. _____ semiconductor is formed when indium impurity is added in pure semiconductor.
- viii. A reverse biased diode has _____ resistance.
- ix. Electromagnetic waves from radio transmitter are intercepted by _____.
- x. _____ satellites are used for TV transmission.

Answers:

i)	ii)	iii)	iv)	v)
Semi-conducting	P-type	High	Antenna	Communication

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2. Tick (✓) the following statements either True or False:

i)	Modulated waves of a radio or TV transmitters are also called carrier waves.	True
ii)	All the waves having VHF and higher travel along line sight.	False
iii)	ALU is a part of CPU.	True
iv)	Modern microprocessors contain millions of transistors, diodes and other components.	True
v)	IT is the combination of combination of computer technology and communication.	True

3. Encircle one choice a, b, c or d in each case:

- i) Which one is the odd thing?

a) digital watch b) radio
c) Juicer d) calculator

Ans: Juicer

- ii) A diode is used as:

a) amplifier b) high resistor
c) rectifier d) modulator

Ans: rectifier

- iii) The device that converts sound waves into electrical waves is called

a) oscillator b) microphone
c) rectifier d) loud speaker

Ans: microphone

- iv) The number of basic units in a computer are

a) 2 b) 4
c) 3 d) 5

Ans: 4

- v) The range of T.V transmission from T.V antenna.

a) 1000km b) 200 km
c) 60 km d) 20 km

Ans: 60 km

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4. How a pure semiconductor material be changed into an N-type material?

Ans: When a pure crystal of Antimony or Arsenic (belonging to group V of periodic table with valence number of -3) is added to a semiconductor, N-type semiconductor is formed with many free electrons in it. So in this case electron are the charge carriers and their flow causes electricity to flow.

5. What is the difference between P and N type materials?

Ans: i. The P-type materials are formed by mixing of a trivalent element into pure semiconductor while N-type is formed by mixing a pentavalent into a pure semiconductor.

ii. P-type material has holes as charge carriers while in N-type charge carriers are electrons.

6. Describe the working of a diode.

Ans: On the basis of their working they are divided into two types.

Forward Biased Diode: In this case the positive terminal is connected to the anode and the negative terminal is connected to the positive terminal. It results in very low resistance and a large current flows through it.

Reverse Biased Diode: In this case the positive terminal is connected to the cathode and the negative terminal is connected to the anode. This results in high resistance and no current flows through the circuit.

7. Write notes on the uses of diodes.

Ans: The diodes allow current in only one direction so they are used in a number of ways like.

- i) They are used to make rectifiers that convert AC to DC.
- ii) They are used in the process of demodulation i.e. detecting the messages form radio waves.

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8. Describe the working of a radio transmitter.

Ans: Radio Transmitting Mechanism:

The sound or music waves are converted into electric signals by the microphone. Different sound waves have different frequency and amplitude.

Modulation: The electric signals of radio range are amplified through A.F amplifier and superimposed over high frequency radio carrier waves of constant amplitude called modulating waves. This process is called modulation. The resulting waves are transmitted through antenna.

9. Describe the major sections of a TV receiver.

Ans: The television consists of two sections.

Audio Section: It consists of rectifier, detector, amplifier and loud speaker.

Video Section: It consists of video detector, video amplifier, scanning and synchronization circuit and a picture tube.

10. What is the difference between cable TV and ordinary TV?

Ans: In case of ordinary TV the information is transmitted in the form of radio waves while in case of cable TV the information is converted into electric signals and transmitted in same form through a cable like and copper cable.

11. Write a short note on satellite TV.

Ans: See Q. No. 6 for answer.

12. What is a CPU?

Ans: **Central Processing Unit (CPU):**

The electronic data is stored first in the memory where it is processed. In modern computers one or more microprocessors are used. The central processing unit consists of two sub-units i.e.

Control Unit: This unit controls the overall working of the entire computer system.

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Arithmetic and Logic Unit: These units carry out the arithmetic and logic operations of the input data.

13. What is the difference between ROM and RAM?

Ans: RAM or read only memory is the temporary memory that loads the data until the computer is on. On the other hand ROM is the temporary memory which is supplied by the manufacturer.

14. Name the basic parts and functions of a microprocessor.

Ans: It consists of a control unit (CU) and an arithmetic and logic unit (ALU).

15. Describe some of the uses of a microprocessor.

Ans: The microprocessors are used in the cameras for the adjustment of the shutter speed and lens. These cameras are easy to operate. They have helped the professional photographers for producing quality pictures.

The microprocessors are also used as a controlling element in many devices like microwave ovens, office machines, mobile phones, game machines, video tape recorders, washing machines, mechanical equipments etc.

16. What meant by IT. Explain.

Ans: Information Technology: "The use of science in order to store, handle and transmit information is called information technology".

Explanation: New advancements in the field of electronics have provided us the devices through which we can be connected to each other at any time, anywhere in the world. Today there is no need of sending letters to our dear ones and then waiting for weeks for reply. This age is called as the age of information. By the use of information technology people of the world coming closer and closer converting world into a global village.

Section-III

Short Questions with Answers

1. Define semi-conductors.

Ans: The semi-conductors are the materials which are less conductors to electricity in between to conductors and insulators.

2. How N-type semiconductor is formed?

Ans: When a pure crystal of Antimony or Arsenic (belonging to group V of periodic table with valence number of -3) is added to a semiconductor, N-type semiconductor is formed.

3. What is a semiconductor diode?

Ans: A semiconductor diode is the material formed by using N-type and P-type semiconductors. It is used in order to facilitate or to resist the flow of current through it by changing its terminals to those of battery.

4. What is the use of semiconductor?

Ans: The N-type and P-type semiconductors have a wide use in many semiconductor devices like diodes, transistors, integrated circuits and amplifiers.

5. What is the property of diodes?

Ans: The property diode is that they allow the flow of current in only one direction. Because of this property they are used to make rectifiers that convert AC to DC.

6. What is modulation?

Ans: It is the process in which electric signals of radio range are amplified through A.F amplifier and superimposed over high frequency radio carrier waves of constant amplitude called modulating waves.

7. What is the function of tuning circuit of radio set?

Ans: The tuning circuit of the radio receiver rejects all the R.F. signals except those which are adjusted or tuned through

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tuning knob. Thus we are able to listen to the sound of our favourite station.

8. Name the circuits of radio receiver.

Ans: A radio receiver consists of three circuits i.e. tuning circuit, radio frequency amplifier (R.F. amplifier) and audio frequency detector (A.F. detector).

9. What is the radio mechanism?

Ans: The speech or music is converted into radio waves at the radio station and then these waves are transmitted through antenna into the atmosphere. These radio waves are received through radio set at home.

10. What is the functional difference between camera tube and picture tube?

Ans: Camera Tube is a photographic tube that produces electrical signals corresponding to the visual information in a picture while a picture Tube is the receiving tube that converts the signal voltage into a visual image in its screen, and thus displays the original picture.

11. How the signals are transmitted in cable television?

Ans: In a cable television electric signals travel through cables from television station or satellite's ground station to subscriber's television receiver.

12. How optical fibres work in the transmission of electric signals?

Ans: In optical fibres the electrical signals of sound and picture are converted into light signals that travel through optical cable containing a large number of thin glass fibres. These signals are then converted into electric signals by optical receiver and then sent to the television.

13. What is the limitation of radio waves in the process of transmission?

Ans: The limitation of the radio waves is that the television transmissions are possible to the limited area of about 60 km radius. This is because of the curvature of earth.

14. What is the working mechanism of satellites?

Ans: The radio waves carrying television programmes are

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focused by a dish like antenna to the satellite orbiting around the earth. The waves received at satellite are amplified. The radio waves are now sent back to earth where satellite dishes placed on roofs of the houses on earth receive them. Here they are converted into electric signals and again a television set is used to reproduce the original picture and sound messages.

15. What is a computer?

Ans: A computer is a highly complicated electronic device processing the entered data and providing results rapidly and accurately. The numeric calculations, which were done in hours manually, are done with the help of computer in the fraction of second.

16. What are input and output components of a computer?

Ans: The input components of a computer are those components through which we feed the data into the computer like keyboard, mouse, scanners, light pen etc. On the other hand the output components are those through which the computed and processed results become visible to the computer user like monitor, printer etc.

17. What is the secondary storage memory?

Ans: The secondary storage memory is used to store data, instructions and processed data by the users. It is used to supplement the capacity of main memory and its storage capacity is usually very large. It includes hard discs and floppy diskettes.

18. Differentiate between ROM and RAM.

Ans: ROM or read only memory is a permanent memory supplied by the manufacturer and contains all the necessary codes and instructions needed for the computer to operate while RAM or read and write memory is the temporary memory. The necessary software and data is loaded into this memory at the turning on of computer.

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19. What is a microprocessor?

Ans: A microprocessor is central processing unit which is constructed on a single chip of silicon. This chip contains thousands of circuit elements which are grown layer over layer on the chip.

19. Define information technology.

Ans: Information technology is the use of science in order to store, handle and transmit information. All the information media like televisions, radios and internet services are its examples.

20. What are the telecommunication devices?

Ans: The telecommunication devices include television, telephone, mobiles, radio, computers etc. They sent the information in the form of computer text files, pictures, sound, video etc.

21. What is a cell in terms of telecommunication?

Ans: It is the area which is covered by one communication station. Every communication station has a limited area to approach.

22. What is the working mechanism of a fax machine?

Ans: Fax machine scans a document and then converts into light and dark parts onto electric signals. These electric signals travel through the telephone wire to the other fax machine at the receiving end where these are reproduced in the original form.

23. Give the difference between working mechanism of fax machine and telex machine.

Ans: A fax machine scans a document directly and then converts the light and dark parts into electric signals while in telex machine text has to be typed first and then it is converted into the electric signals.

24. Why the optical fibres are being preferred over copper cables?

Ans: The optical fibres are very efficient in carry light signals from one place to other. They can carry light signals thousand times greater than those from other cables.

Objective Questions and Answers

- _____ is used to form N-type material.**
a) Arsenic b) Indium
c) Gallium d) none of these
- The charge carriers in P-type materials are:**
a) protons b) electrons
c) neutrons d) holes
- The reverse diodes offer _____ resistance to the current flow.**
a) more b) equal
c) less d) zero
- The amplifiers are present at the broad cast stations to _____ of frequency of radio waves.**
a) maintain b) decrease
c) increase d) none of these
- _____ is an output device.**
a) keyboard b) mouse
c) light pend) printer
- _____ is used for converting the picture into electric signals.**
a) microphone b) camera tube
c) RF unit d) picture tube
- RF detector is preset at _____.**
a) receiving system b) broadcast station
c) transmission end d) satellites
- The radio waves are transmitted through:**
a) atmosphere b) cable
c) light d) optical fibre

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9. _____ are not the electromagnetic waves.
a) alpha waves b) radio waves
c) x-rays d) sound waves
10. _____ are used to convert AC into DC.
a) transmitters b) amplifiers
c) modulators d) diodes
11. One way flow is maintained by _____.
a) radio detectors b) diodes
c) transmitters d) microprocessors
12. The radio waves with the velocity of _____.
a) light b) wind
c) sound d) alpha rays
13. _____ is used to convert sound into electric signals.
a) picture tube b) microphone
c) camera tube d) none of these
14. RAM is _____ memory.
a) permanent b) primary
c) both of these d) none of these
15. Floppy disk is a type of _____ memory.
a) primary b) permanent
c) secondary d) temporary
16. One of the followings is not an output device.
a) monitor b) printer
c) keyboard d) all output devices
17. Radio signals are only received in an area of _____ km.
a) 40 b) 60
c) 50 d) 70
18. The information travels in the form of _____ signals in cable.
a) wave b) light
c) sound d) electric

- Answers:**

1. a	8. a	15. c	22. b
2. d	9. a	16. c	23. d
3. a	10. d	17. b	24. c
4. c	11. b	18. d	25. b
5. d	12. a	19. b	26. a
6. b	13. b	20. d	
7. a	14. c	21. c	

Section-V

TEST YOUR MEMORY

Fill in the blanks and True or False questions are not included in the examination paper. However the same are being given for Memory Test of students.

a. Fill in the blanks:

1. _____ and Germanium are the two very important semiconductors.
2. In a diode _____ is present between anode and cathode.
3. In N-type material charge carriers are _____.
4. In P-type material charge carriers are _____.
5. A semiconductor diode is formed when _____ and _____ type materials are formed at opposite sides.
6. A diode conducts when its _____ is given positive charge and _____ is connected to negative terminal.
7. A bulb in the circuit glows when _____ conducts.
8. A diode allows current to flow in _____ direction.
9. A process of recovery or detecting the message from radio waves is called _____.
10. Radio waves are _____ waves like heat waves light waves or x-rays.
11. A radio set is an _____ instrument.
12. The resultant carrier waves are called _____ waves.
13. The resultant carrier waves are called modulated waves and process is called _____.
14. A camera tube is a _____ tube.
15. The image reproducing tube also called as _____ tube.
16. The electric signals from camera tube are called _____ signals.
17. The video signal is transmitted after _____.
18. Receiving antenna intercepts waves from a _____ transmitter.
19. In television system _____ waves are used to carry picture.
20. A cable can carry _____.

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21. Electrical signals of picture and sound are first converted into _____ signals.
22. Radio waves travel along _____.
23. Radio are waves received by _____ in space.
24. A computer is an _____ device.
25. Arithmetic and logic unit carries out _____ and _____ operations on the data.
26. There are _____ types of storages memory used in a computer system.
27. ROM is a _____ memory.

Answers:

1.	silicon	15.	picture
2.	band	16.	video
3.	electrons	17.	modulation
4.	holes	18.	T.V
5.	P, N	19.	radio
6.	anode, cathode	20.	sound
7.	diode	21.	light
8.	one	22.	line of sight
9.	demodulation	23.	satellites
10.	electromagnetic	24.	electronic
11.	electronic	25.	arithmetic, logic
12.	modulated	26.	two
13.	modulation	27.	permanent
14.	photoelectric		

b) Indicate the True/ False Statements:

1. P-type materials contain free electrons.
2. Arsenic belongs to the third group of periodic table.
3. Antimony belongs to fifth group of periodic table.
4. Holes are present in P-type materials.
5. An element of third group and other of fourth group combine to form N-type material.
6. Indium belongs to the third group.
7. Gallium is used to make N-type material by mixing it with a semiconductor.
8. A band is present in between a cathode and anode.
9. Current is readily conducted in a reverse diode.
10. A forward diode offers less resistance.

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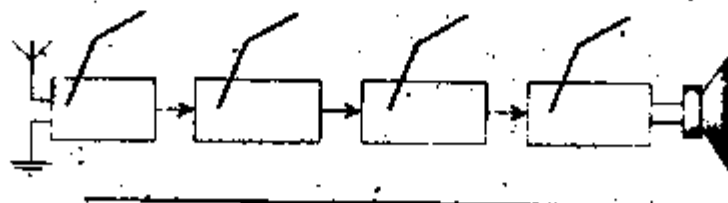
11. Diodes allows current to flow only in one direction.
12. Radio waves are material in nature.
13. Radio waves move with the velocity of sound.
14. Diodes are used for the detection of radio waves.
15. A microphone converts electric signals into sound waves.
16. A radio is an electronic device which is used for the transmission of radio waves.
17. An amplifier increases the frequency of speech or music before sending it to the atmosphere.
18. The electric signals are received by the antenna of a radio set.
19. A modulator is present in the receiving system of radio set.
20. There are three groups of circuits in a radio set.
21. The frequency of the signals can be adjusted by the turning of knob.
22. AF detector is a component of radio receiver.
23. Loud speaker converts the electric signals into radio waves.

Answers:

1. False	9. False	17. True
2. False	10. True	18. False
3. True	11. True	19. False
4. True	12. False	20. True
5. False	13. False	21. True
6. True	14. True	22. True
7. False	15. False	23. False
8. True	16. False	24.

c. Identify and label the following figures:

Figure 1



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Figure 2

